DISCOURSES

Serfogee Rajah 1830

ON THE

NATURE AND CURE

OF

WOUNDS

THE TANJORE MAHARAJA SERFOGI'S SARASWATI MAHAL.

IN TWO VOLUMES.

BY JOHN BELL, SURGEON.

THE SECOND EDITION.

VOL. I.

OF WOUNDS IN GENERAL.

OF PROCURING ADHESION.
OF WOUNDED ARTERIES.
OF GUN-SHOT WOUNDS.
OF THE MEDICAL TREATMENT OF WOUNDS.

EDINBURGH:
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1800.

TO

ERASMUS DARWIN, M. D.

KNOWN TO THE AUTHOR ONLY BY HIS VALUABLE WORKS,

THIS BOOK IS PRESENTED,

AS AN HONEST AND INDEPENDENT TESTIMONY

OF

RESPECT AND GRATITUDE.

THOSE WHO, TO MEDICAL SKILL,

JOIN LIBERAL AND ELEGANT STUDIES,

ENNOBLE THEIR PROFESSION.

AND ARE ENTITLED TO FREQUENT MARKS OF PUBLIC ESTEEM.

THE

AUTHOR OF THESE DISCOURSES,

INSTEAD OF COURTING PATRONAGE,

THINKS HIMSELF MORE HONOURABLY EMPLOYED

IN THUS ACKNOWLEDGING

HIS SHARE OF

THE COMMON DEBT.

ADVERTISEMENT.

IT is becoming in an Author to give ſome reaſon to the Public why a book with ſo many faults is ſo little improved.

Theſe Diſcourſes on Wounds are too imperfect to be much altered, too good to be entirely thrown away.—The Plan was limited at the firſt, and the Work muſt remain in its original form, for, without changing its character it can hardly be improved.

Nothing more was deſigned than a ſketch, of a great and intereſting ſubject; but that ſketch has been favourably received; it has been found uſeful; an Edition of Sixteen Hundred Copies has been rapidly ſold; and the approbation of the Public forbids the Author ſaying much concerning thoſe imperfections which an Author muſt feel more ſenſibly than others, which, if he have a due reſpect for himſelf, he will be proud to acknowledge.

It is ſome time ſince theſe Diſcourſes were compoſed: The Author was, even at the firſt, conſcious of many imperfections, and is ſenſible that he now regards them with ſuch impartial and chaſtened approbation as a friend might indulge: The natural progreſs of the mind, when continually

employed in the purſuit of knowledge, inclines every man of ſenſe and diligence to think, perhaps, too humbly of paſt labours. The Author of this Elementary Book has been at pains to correct ſome of the many errors of the Firſt Edition, and ſhould be happy to make this more worthy of the approbation of the Public, or of thoſe Gentlemen to whom it is inſcribed.

But while he is employed in another work, in which the general principles of Surgery are more fully diſplayed, he ſhall feel himſelf greatly ſupported if the Public condeſcend to receive, with any degree of favour, this Second Edition of the Book on Wounds.

Edinburgh 1800.

THE TANJORE MAHARAJA SERFOJI'S SARASVATI MAHAL. *

PREFACE

TO THE

FIRST EDITION.

THE Author of these Discourses will not allow himself the benefit of that apology, to which he is but too well entitled; for the apology of want of time surely is not respectful towards the Public: it intimates, that with time the Author could have written a more orderly and a better Book; an intimation which is always immodest, and often untrue. The Author knows but too well how often, in this book, the marks of hurry will strike his Reader. He mentions his consciousness of this with regret! He feels the necessity of requesting that indulgence which every author needs and claims.

THE very plan and title of this Book is new; and the Author has deviated from accustomed forms in this instance, from no other motive than the hope of making these Lessons both

pleaſant and uſeful. This method of teaching by Diſcourſes is as yet untried: it may have its advantages, it muſt have its faults; and this increaſes that kind of anxiety which is inſeparable from the act of appearing before the Public, and which even the ſenſe of duty can hardly relieve.

The Author has endeavoured to bring into one eaſy and comprehenſive view, thoſe leſſer operations of Surgery, which are not found under that much abuſed title of a Complete Syſtem. He has endeavoured to intereſt his Reader, in the manner of managing wounded Arteries, and in many of the leſſer points of practice. He has attempted to refute ſome favourite doctrines, not wantonly, but boldly; "not becauſe they belong to this Doctor or that Profeſſor," but becauſe they ſeemed to him totally inconſiſtent with true philoſopy, and, incompatible with ſound Surgery, in as far as it is as yet founded upon a knowledge of the powers and principles of the human body. He has uſed all that freedom with great names which the cauſe of truth and ſcience requires: he has publiſhed boldly many criticiſms which he would not have ventured to mention in his Lectures, or in private:

for there criticifm is no longer criticifm, but the foul report and private malice of it works like a fecret poifon, againft which there is no preventative nor cure. He has criticifed the opinions of thofe chiefly, who, being at the head of the profeffion, are of courfe the beft able, and, to all appearance alfo, the moft willing to defend themfelves.

But the Author has never allowed any purfuit of this kind to break in upon the order or purpofe of his Difcourfe, which he has endeavoured to keep clear of all encumbrances, and in a plain and eafy form: He has endeavoured to order it fo, that his Reader may have firft a free and general notion of each fubject in the body of the Difcourfe, and he has put down more exprefs and accurate rules at the conclufion of each: He has introduced the lighter pieces of hiftory, to give eafe and life to the fubject; and to give it weight and firmnefs, he has added rules of practice. He has endeavoured to give comprehenfive and general notions, of Wounds—of Wounded Arteries—of Bruifed or Gunfhot Wounds—and of Wounds of the Breaft, Belly, Head, Throat, and Limbs, and efpecially of the condition of Limbs wounded with dan-

gerous complications, as of lacerated Arteries and bruiſed Bones.

He truſts, that his manner of explaining theſe ſubjects will be plain and eaſy to the young Surgeon, to whom alone he preſumes to addreſs himſelf; and having thus honeſtly told his motives and his higheſt expectations, he hopes to find every indulgence; and may be permitted to ſay, with Lord Halifax, That he who is reſolved to play the critic with this Book on ſtricter terms, "muſt have a degree of generous irregularity in his reaſoning, elſe he will not be a good thing of his kind."

DISCOURSE I.

ON PROCURING ADHESION.

WHEN a modern ſurgeon allows himſelf to talk about the "mundifying, incarning, and cicatrizing of wounds, or directs how to fill the wound up with good and ſound fleſh, and keep it to a fair and even level with the adjacent ſkin," he but proclaims his own ignorance of the properties of the living body. Perhaps he talks this language idly, and in mere compliance with the uſual forms of ſpeaking; but if he has ſeriouſly any ſuch idea of the buſineſs and duties of a ſurgeon, there is much reaſon to fear, that his methods, far from incarning or cicatrizing wounds, will rather interfere with the regular proceſs of nature.

It is an old, but it is a becoming and modeſt thought, that in our profeſſion, we are but as the miniſters of nature: and indeed the ſurgeon, ſtill more than the phyſician, atchieves nothing by his own immediate power, but does all his ſervices by obſerving and managing the properties of the living body; where the living principle is ſo ſtrong and active in every part, that by that energy alone, it regenerates any loſt ſub-

ſtance, or re-unites in a more immediate way, the more ſimple wounds.

When we can prevail upon ourſelves to renounce this parade of idle words, and to reſign alſo our ſupreme office of aſſiſting nature in "mundifying, incarning, and cicatrizing wounds, of filling the wound with ſound fleſh, and of keeping it to the right level, ſo as to make an even and ſeemly ſcar," we ſhall find our duties happily reduced within the narroweſt bounds, viz. of ſaving the patient from immediate bleeding, and of laying the wounded parts ſo cleanly, ſo neatly, and ſo evenly in contact with each other, that they may adhere. The reſt we leave to nature.

I fear, that from my announcing a rule of conduct ſo ſimple as this is, you will ſuppoſe, that I mean to ſpeak only of the ſlighter, and more trivial wounds; while I do really mean to include under this general view, the greateſt and the ſmalleſt wounds; and to eſtabliſh but one rule for all, from the amputation of a limb, or the extirpation of a tumor, to the moſt trivial cut of the cheek or hand.

What is amputation but a wound? The greateſt wound,—clean and fair,—made carefully by the hand of the ſurgeon,—diſpoſed to heal in the eaſieſt way? And in this great wound, (which, à fortiori, includes the doctrine of every leſſer wound), what is there to attend to, but the procuring of adheſion, or the ſtopping of the flow of blood? What were the defects of the old operations, but that the ſurgeon knew not who to procure this adheſion? that he had no means by which he could ſtop the bleeding? The hæmor-

rhagy was fatal to moſt of thoſe who needed to ſuffer this operation; and the few who ſurvived, lingered through all the miſeries of a nine months cure, tedious and imperfect, with conical, ulcerated, and tender ſtumps.—What indeed is the chief perfection of modern ſurgery, or the excellency of our operations? but that in bleedings from great veſſels we truſt nothing to compreſſion, cauteries, or aſtringents, but tie our arteries firmly; and that we talk no longer about mundifying, incarning, or cicatrizing of wounds; that we never dreſs the cut ſurfaces as diſtinct wounds, but put the ſides or lips in cloſe contact, and keep them ſo. We boaſt nothing of our own powers, but truſt all to nature, whoſe buſineſs it is, to make thoſe ſurfaces adhere which will adhere, or to re-unite by the ſlower proceſs of ſuppuration and granulation, the parts among which there has been a loſs of ſubſtance.

Of theſe two great points, this of the ſpontaneous adheſion of parts, is what I ſhall firſt explain. This doctrine of the adheſion of cut ſurfaces, and the inoſculation of arteries, was but lately underſtood; and very ſlowly and unwillingly received. Indeed the tales which were at firſt told of it, were ſuch as might have diſcredited the whole; for it happened with this moſt important diſcovery of adheſion, as with the no leſs certain and curious phenomenon of the regeneration of the humours of the eye, or as with the intereſting experiment of the ſafe and eaſy transfuſion of the blood, that the extravagance of its inventors ruined the invention, and took away all hopes of profiting by it. Burhius and Kirkringius pretended to be poſſeſſed

of particular medicines by which they could reſtore the eye, after it had been burſt or cut open: and Taylor, Woolhouſe, and others, pretended to cure the blindneſs of old age, by extracting the muddy humours of the eye, and replacing them with freſh tranſparent humours, by which the ſight became as clear and fine, as in the youngeſt perſon *.

* Kirkringius tells his ſtory in the following lamentable terms: That the King of Denmark who was as ſkilful in ſciences, as clear in governing his realms, one day when he was reading a curious book upon glaſs-making, written by Andreas Friſius, aſked his Phyſician, Burhius, who was ſtanding by, whether this ſtory that the author told in his preface could be true, about cutting the eye open, and letting out the humours, and reſtoring it again? "O!" ſays Burhius, "That Theodorus Kirkringius, mentioned there ſo honourably, is one of the pooreſt of my ſcholars in this art." Kirkringius in revenge tells the whole ſtory; how he had heard of Burhius being poſſeſſed of this art; how he had wiſhed to aſk the ſecret; and how he was aſhamed to propoſe buying it with money from a gentleman like Burhius; how he ſtudied and laboured to find it out; and how he ſucceeded without any obligation to this ſame Burhius. "Hoc ſcio, et hic profiteor me nullis horum modorum oculos reſtituere; reſtituere tamen alia prorſus ratione, aliiſque a me ſolo inventis viis addo; hec facere me diſtinctionem inter albos et nigros, ſed quolibet oblato animali," &c. "It matters nothing to me whether the eyes be black, brown, or grey, bring me what animal you pleaſe, I ſhall cut the eyes open, ſqueeze out all the humors, give him back to you as blind as a mole, and yet reſtore his eyeſight in a very little while: I have done it often for fun, and have done it three times on the ſame dog." Now, this was what Burhius could not do according to Kirkringius; for Kirkringius tells how he was admitted to one of Burhius's exhibitions which failed, and the dog goes to this day in the ſtreets of Amſterdam blind of that eye. "Qui canis adhuc hic Amſtelodami vivit quidem, ſed non vidit illo qui diſciſſus fuit oculo."

Many pretended to reftore to the aged, health and ftrength, by withdrawing from their fyftem the effete blood, and filling them up with healthy and youthful blood. In like manner, did Talicotius write his long and not inelegant book, about the reftoration of parts of the body which had been loft. And Garengeot had the boldnefs to tell a ftory, about "a young fellow, a foldier, who, reeling out of a tavern drunk with fome of his companions, got into a quarrel, in which one of them bit off his nofe, threw it into the gutter, and trod it under foot: He gathered his nofe up, flung it into Mr. Gallin's, an Apothecary's fhop, ran after the fellow who had done it, and when he returned, Mr. Gallin wafhed the nofe at the well, ftuck it with plafters in its place, in two days after, it was firmly united, and Mr. Garengeot, four days after, dreffed the nofe with his own hands."—Vid. Vol. III. p. 55. And if we may believe one writer of good abilities, the beft modern ftories of adhefion, (as of a tooth adhering to a cock's comb), are little better than Talicotian tales, or this by Garengeot of the foldier's nofe *.

But even when this doctrine of adhefion came to be fpoken of in a fenfible and modeft way, and became a queftion of the higheft importance in practice, it was very difficultly and flowly received.

Thirty years ago, furgeons had no fettled notions, that cut furfaces might be made to adhere: they had

* I had neglected to repeat this experiment myfelf. I mentioned here a doubt fuggefted by a modern writer. But my friend Aftley Cooper, has fince convinced me of the fact.

no motive for faving the fkin; or when they had faved it, they did not know how to apply it to the other cut furfaces, nor how much it might contribute to a fpeedy cure: if they extirpated a tumor, they cut away along with it all the furrounding fkin: if they performed the trepan, they performed in a moft regular manner that preliminary operation which they chofe to call fcalping; or in plain terms, they cut away fix or eight inches of that fkin, which fhould have faved the fractured fkull from exfoliation, and fhould have immediately covered and defended the brain: in performing amputation, they cut by one ftroke down to the bone; and even when they performed the flap amputation, they dreffed their ftump and flap as diftinct fores. An exfoliation of the bone, in thefe older operations, was a thing unavoidable; fo that it was part of their art and fkill to procure exfoliation. And the filling up and final healing of their conical ftump was fo flow a procefs; fo imperfect; and fo many exfoliations of the bone, with other lets and hinderances intervened, that it is no wonder their imagination was much occupied about the digefting, incarning, and cicatrizing of wounds. Whenever a bone was laid bare, they believed that it muft exfoliate before it could heal; until they faw this exfoliation perfect, till the bone had at leaft thrown off an outer fcale, they would not permit it to heal; they would not lay the fkin down upon a wound upon the fhin bone, if there was a lacerated fcalp, they cut the torn piece off; a large part of the fcalp could not be regenerated in lefs than feveral weeks or months; and fo they made good their

opinion by their practice; for very generally in that ſpace of time, the whole, or a part at leaſt, of the expoſed bone, was thoroughly ſpoiled. Theſe were a few of the many miſtakes committed daily by the older ſurgeons; who were contented with their theories about incarning, and cicatrizing of wounds, too proud of their own art, and too little inclined to follow the ſimple ways of nature.

It was in the time of diſcuſſing this very point of amputation, and eſpecially in debating the ſubject of flap operations, that this diſcovery of the univerſal doctrine of adheſion began. The French ſurgeons had declared, not only that their flap amputation procured an eaſy and perfect cure, but they affirmed that often in three days, the fleſh of ſuch a ſtump had adhered. To this O'Halleran replies, with a rudeneſs and ignorance quite unparalleled. "I would aſk," ſays he, "the moſt ignorant tyro in our profeſſion, whether he ever ſaw, or heard even, of a wound, though no more than one inch long, united in ſo ſhort a time?" "Theſe tales are told," he adds, "with more confidence than veracity; healing by inoſculation, by the firſt intention, by immediate coaleſcence without ſuppuration, is merely chimerical and oppoſite to the rules of nature." This was the aſſertion of O'Halleran, himſelf an excellent and moſt judicious ſurgeon; and all the beſt ſurgeons of the preſent day, as Mr. White, Broomfield, &c. have followed his doctrine and practice; dreſſing their circular ſtumps with rolls of fine linen, laid within the circle of the ſtump; and when they amputate by the flap operation, they dreſs the flap and

the face of the ſtump as ſeparate ſores, till the twelfth day.

When O'Halleran talked this bold uncivil language about confidence and veracity, he little thought that he ſhould live to ſee the doctrine of adheſion followed by a univerſal practice of laying down the flap; or the moſt ordinary ſurgeon procuring ſometimes a perfect adheſion on the third day. But ſurgery has improved gradually within theſe twenty years. Obſervations have been carefully made, and publiſhed early in pamphlets or journals. Doctrine and practice have gone hand in hand. The particular practice of procuring adheſion belongs to no one perſon; but was paſſing continually from hand to hand, from one friend to another, the common doctrine and diſcourſe of the day. It was gradually extending in its application, and growing ſtrong, like every practical doctrine, by ſlow degrees. It was applied firſt to amputation; then to trepan; then to the extirpation of ſcirrhous mammæ; then to all great operations; then to all recent wounds. If we are more particularly indebted to any one man, it is to Allanſon; who continuing through all his practice to make neat operations, and careful notes, has given us the reſult, in a form and language which make his writings, notwithſtanding the nature of his ſubject, as pleaſant almoſt as they are profitable to read. And yet, (as O'Halleran ſays on another occaſion, p. 222.) "We muſt not wonder to find ſome people, ſcarcely known beyond their own ſphere of action, modeſtly whiſpering their claim to this honour." A quotation, which in its ſenſe and true meaning, may be fairly applied to the

present occasion, word for word, all but one *. I have been at pains to represent this improvement as gradual and silent; as having obtained by general and

* Which of these words my reader shall strike out, I shall leave to his own honour and good sense to determine, after he shall have read the following quotation; observing, in the first place, that Mr. O'Halleran published his book chiefly with the design of teaching surgeons how to save skin; that Mr. Allanson published his book to teach surgeons how to put that skin down so as to make it adhere; and that a third author, the only modern surgeon who has claimed the doctrine, is the only modern surgeon who does not understand its real value. He delivers the following curious history of this doctrine of adhesion: "As I consider the improvement by which these ends "are effected as one of the most important in modern practice, I hope "to be excused if I shortly state the share I have had in the intro-"duction of it, before proceeding to describe the operation itself.

"In the course of my education while attending the hospital here, "as well as the hospitals of London and Paris, the inconveniencies "arising from the want of attention to the saving of skin, in different "chirurgical operations struck me strongly, so that I was resolved to "take every proper opportunity, in my own practice, of treating this "point with particular attention.

"From the year 1772, when I settled in business, I laid it down "as a maxim not to be deviated from, to save as much skin and cel-"lular substance in the removal of tumors, whether cancers, or others, "when the soundness of parts admitted of it, as would completely "cover the sores," &c. &c.

"After this had been practised for several years, Mr. Allanson of "Liverpool, in the year 1779, published some observations upon am-"putation, in which a method of operating is described," &c.

The claiming so late as the 1772, or rather the 1788, a discovery which was published by O'Halleran in the 1765, must excite some feelings very different from resentment; but any one who claims in the 1788, the doctrine of adhesion, which Allanson had so fully explained in the 1779, must be answered: And the answer is plainly

common confent, by a flow communication of remarks from friend to friend, till at laft the practice was fairly eftablifhed; and no man could fully claim an improvement in which every man had fome little fhare.

This univerfal doctrine and practice of procuring adhefion, has done more for furgery in a few years, and moft efpecially for the furgery of wounds, than any other general obfervation: not excepting even the

this, that feveral other paffages of the fame author fhow, that he did not even underftand what Mr. Allanfon was doing, *ex. gr.*

"When fpeaking of the time in which ftumps may be expected to "heal, I think it right to obferve that it fhould not be our object to "accomplifh a cure in the firft inftance, without the formation of "matter; it *commonly anfwers better* when effected in the more gradual "manner we have pointed out. When a ftump heals fuddenly, and "the edges of the divided fkin adhere by the firft intention, the te-"guments are apt to be puckered and uneven, and the ligatures of "the arteries are removed with difficulty, &c.

"It is my own opinion that the fecondary union recommended by "Mr. O'Halleran is the beft. The cure would appear to be in ge-"neral accomplifhed more quickly in this way than in any other; "even where the flap has not been applied to the fore till the four-"teenth day, the cure has been completed before the fourth week, "whereas few, if any, cures have been effected fo early where the "flap has been applied immediately after the operation."

A man who has invented a doctrine, very generally underftands it, at leaft as well as his neighbours, and pufhes his difcovery rather beyond the mark.——But this author "cares not whether the fkin be laid "down for adhefion, or whether we drefs the flap and the ftump as "two diftinct fores." In fhort, far from fpeaking in the enthufiaftic paffionate tone of one pleading for his own difcovery, we may know that this does not belong to him by the very token which difcovered to Solomon which of the two harlots was the mother of the living child, "for behold one of the women faid nay, but let it be neither "thine nor mine, but divide it."

greateſt of all diſcoveries, the circulation of the blood. It is now well proved, that ſkin will adhere to ſkin, fleſh to fleſh, bone to bone, and all theſe parts to each other. One part only of the human body, cartilage, will not adhere; I have ſeen many proofs that cartilage does not inflame, nor ulcerate, nor give out granulations, nor generate new fleſh, or at leaſt it does ſo very ſlowly. A wound heals over a cartilage, but not by uniting with it.—We amputate a toe, and the flaps unite in two days, but ſtill they have united with each other only, and not with the cartilage of the joint which we have cut; and in a luxated limb, we find that the bone continues diſplaced, the cartilage never inflames, never unites with the lacerated parts, never in any circumſtances adheres. For the proceſs of adheſion is really this: either the arteries of oppoſite ſurfaces inoſculate mouth to mouth, or rather each cut ſurface throws out a gluten; the gluten fills up the intermediate ſpace; into that gluten, the leſſer arteries of each cut ſurface force themſelves, and it is thus perhaps by the generation of a new intermediate ſubſtance, that the continuity and entireneſs of the part is ſo quickly reſtored. If any one point fail to adhere, there the wound muſt run into ſuppuration; becauſe at that point there is a ſeparation of parts, which being equivalent to a loſs of ſubſtance, requires the generation of new fleſh. When the oppoſite ſurfaces conſent and harmonize with each other, in their mode and period of action, then they adhere; and ſo ſkin adheres to ſkin, or fleſh to fleſh. But if one of the oppoſite parts enters in-

ſtantly into a lively action, while another has only a languid action, and enters into that action ſlowly, and at a long interval of time; the action of the one has expired, before that of the other has begun. Such parts therefore do not conſpire and harmonize in their action, nor can they unite with each other; but they may live and thrive independent of each other: and perhaps it may happen in this way, that oppoſite ſurfaces of ſkin or muſcle, may ſeem to be adhering firmly to the parts beneath them; while, perhaps they adhere to each other only, and merely cover the cartilage or bone, without having any direct connection with thoſe parts. The bone we ſee, (as in an old amputated limb), lives and thrives, is not limited in its new formation by the adheſion of ſurrounding parts, but grows out into a broad knob of callus or new bone. A griſtle alſo, (as in an amputated or luxated joint), retains its pure and lubricated form.

There are, no doubt, accidents both of the conſtitution and of the wound, which will prevent adheſion; for if the patient be of a bad habit of body; if he be lying in a foul hoſpital, in the midſt of putrid ſores, and breathing a contagious air; if he be ill of a fever, or flux, or any general diſeaſe; then the properties of the body being leſs perfect, his wound will not adhere: or if the wound be foul, made with a poiſoned weapon, or left with foreign bodies ſticking in it, or if blood be poured out into the cavity of the wound, (for blood in this caſe is but a foreign body*), or if

* It is not eaſy for any one who is not an enthuſiaſt in the "doctrine of life in the blood," to acknowledge all the very extraordinary conclusions which have been deduced from it.

there be a wounded lymphatic, or wounded ſalivary duct, a wounded inteſtine, or a bleeding artery or vein; any of theſe cauſes will prevent the immediate adheſion of the wound: or if it be a bruiſed or gun-ſhot wound, there is a deſtruction of parts; the loſt parts muſt be regenerated, and thoſe parts which remain, muſt enter into a new action for generating new parts, and ſo they cannot adhere.

This adheſion, then, is a property of the parts of the living body, which is perfect only while their ſtructure is entire; which operates only where the oppoſite parts touch each other by the fulleſt contact, and ſympathiſe with each other in their period and degree of action. It is interrupted if any foreign body be interpoſed; it is leſs perfect in every unhealthy condition of the ſyſtem;—but it is a property, of which we are now ſo well aſſured, that we look for its good effects in the greateſt as well as in the ſmalleſt wounds; and the union of a hare-lip after it has been cut and pinned, repreſents the perfection of that cure which we attempt in every greater operation, and more confidently, in every ſmaller wound; ſucceeding ſometimes as perfectly after an amputation of the thigh, as after the moſt trivial wound of the cheek.

This property of re-union in divided parts is proved, by every day's experience, to be ſo perfect, that where we do fail, (which, no doubt, is ſometimes owing to a bad habit of body), we have much reaſon to believe, it is owing to ſome negligence on our part; ſome extravaſated blood, ſome open artery, ſome

portion of detached bone left in the wound, or ſome awkward piece of dreſſing which lies betwixt the edges, which ſhould adhere; or moſt frequently to the want of that perfect and abſolute contact, which is ſo eſſential to the perfect adheſion, that every part of the wound which does not touch ſome oppoſite ſurface, muſt ſuppurate before it can heal. This is my chief motive for putting down carefully, in ſhort diſtinct rules, the ſeveral ways in which a wound may be put together, ſo as to make it adhere.

There is no wound in which we may not try with perfect ſafety to procure this adheſion: for nothing ſurely can be more kindly when applied to a wounded ſurface, than the oppoſite ſurface of the ſame wound; it has been but juſt ſeparated from the oppoſite ſurface; it may immediately adhere to it; though it do not adhere, no harm is done, ſtill the wound will ſuppurate as kindly, as freely, as if it had been roughly dreſſed with dry cadeſs, or ſome vulnerary balſam, or acrid ointment: If only a part ſuppurate, while one half perhaps adheres, then half our buſineſs is done: And in ſhort, this ſimple way of immediately cloſing a wound is both natural and ſafe.

1. A fair longitudinal cut in the ſkin only, may be brought together merely by a good ſticking plaſter; or by a piece of common black court-plaſter in ſmaller cuts; or by a plaſter of diachylon in large cuts. The plaſter ſhould be uſed in ſuperficial cuts of the face, hands, feet, &c. or even over the fleſhy parts, if little deeper than the ſkin; and in naked and bony parts, as in the hairy ſcalp, or on the back of the hand,

compresses laid upon each side of the cut, will keep its edges in close contact with each other; and will so support the sticking plaster, as to save the necessity of making a stitch with the needle, which is surely cruel wherever it is unnecessary *. I have never found it necessary to use hare-lip pins in any piece of skin which lies solid upon a bone, as that of the face or scalp, or the back of the hand. I have never used any thing but plasters merely, after little operations upon the forehead, face, or cheek; unless there was some loss of substance †.

2. In some looser parts of the skin, especially when moved by strong muscles, we either make a stitch of the needle, or we use rather what is called the twisted suture, or hare-lip suture, which is the largest of all. Thus the lip, for example, is so retracted by all the

* Sutures make knotty scars, and therefore whenever (in the face especially) a plaster will answer the purpose, we should avoid them.

† The older authors choose to call this manner of applying plasters by the affected and absurd name of SUTURA SICCA, or dry suture. In applying such a plaster, we are careful first to let the bleeding subside;—then to make an assistant put the lips of the wound neatly together; then we apply one end of the sticking plaster to the skin on one side of the wound, and let it dry and fix there, so that we may pull by it;—then we pull that edge by the plaster;—then moisten the remaining half of the plaster;—then lay it neatly down over the opposite edge of the wound;—then apply successive plasters till we have crossed the whole line of the wound:—Then, if any one of the slips of plaster has lost its hold by the oozing out of the blood, we take it gently off, wipe the surface, and apply a new one neatly, until we have got the whole clean and fair, all the plasters sticking soundly; and, lastly, We lay a compress over the whole, which we bind down a little with a circular roller, in order to prevent internal bleeding.

muſcles of the cheeks, that when cut it gapes much, and requires to be very well ſecured; therefore after cutting the edges of a hare-lip, or after cutting out a cancer of the lip, we put the broad edges neatly together; transfix both lips at points exactly oppoſite to each other with a large pin, which is called, (from this particular operation), the hare-lip pin; we paſs two pins through the lip, one at the very edge, or vermilion part of the lip, and one in the middle of the cut, and then twiſt a thread about them in the form of a figure of 8. This is named the hare-lip ſuture.

This ſuture may be uſed in any other ſuperficial wound of the ſkin. It is leſs neceſſary in the ſcalp, and other firm parts which lie over the bone. It is more neceſſary in the looſer, and eſpecially in the more muſcular parts, as in the lip, or perhaps in the cheek. In accidental wounds of the lip, in boys, I have uſed the common ſewing needle, which paſſes with very tolerable eaſe.

3. In angular wounds of the ſkin, a ſtitch of the needle will be uſeful, to keep up the corner to the angle which it belongs to; and this of courſe, ſupports the ſides, and keeps them in contact. Then we ſhall ſeldom find it neceſſary to make more than one ſtitch, and that exactly in the place of the angle; this ſtitch will ſupport the angle, and the ſticking plaſters may be laid ſo as to ſupport the ſides.

4. Long wounds, down to the fleſhy parts, even though they have no angle, will need ſtitches; if the cut be acroſs the line of a muſcle, the gaping will be greater; if it run along the courſe of the muſcle, the gaping

will be leſs; but ſtill ſuch as to require a ſtitch. A long fleſhy wound will require ſtitches, even for that gaping which ariſes merely from the length of the wound, independent of the contraction of the muſcular fleſh; and the ſtitches muſt be multiplied, according to the length of the wound; making, for each inch of the wound, one ſtitch of the needle*. From this interruption, theſe ſeparate ſtitches have been named the Interrupted Suture. The ſtitches counteract the general retraction, they keep the ſeparated parts in contact; but to keep the whole edge of the wound neat, one ſlip of black plaſter muſt be laid in the interſtice of each ſtitch. Theſe plaſters keep the whole wound even; ſupport the ſtitches, ſo as to leave leſs ſtraining upon thoſe ſeparate points; and enable you to cut your ſtitches early out, for a reaſon which I ſhall preſently explain to you†.

* Perhaps, as a general rule, the following directions from one of our oldeſt and beſt authors may be followed.—“If the wound be of two “fingers breadth, make one ſtitch in the middle; if three fingers “breadth, make two ſtitches; if four fingers breadth, three ſtitches; “and ſo go on, making a ſtitch leſs than the wound is in number of “fingers: Sometimes in declining parts we make our ſtitches at a “little more diſtance.”—*Wiſeman.*

† The older ſurgeons were very proud of their ſutures, and ſtill prouder of the names they gave them. They called it a Continued Suture, when they ſewed the wound all along like a ſeam; they called it the Glover's Suture, when they paſſed their needles alternately from the inſide to the outſide of the wound; they alſo uſed the Shoemaker's and the Taylor's Suture. They called it the Interrupted Suture, when they cloſed a long wound by interrupted ſtitches; and Twiſted Suture, when they uſed pins as in hare-lip; they called it the Quilled Suture when they uſed the quills; the Gaſtro-raphia, when they ſewed a

5. If the wound be ſtill deeper among the muſcular fleſh, the ſtitches cannot go to the bottom of the wound; the ſtitches muſt be ſupported, and the bottom muſt be preſſed together by compreſſes, and the uniting bandage: This bandage is made by putting a double headed roller round the part, paſſing one head of the roller through a ſlit in the oppoſite ſide of it, and drawing both at once.

6. If the wound be pretty deep among the muſcular fleſh, ſo that the ſeveral ſtitches of the interrupted ſuture would make, (if tied by the common knots), an awkward and painful ſuture, likely to excite inflammation; we then convert the interrupted ſuture, into what is called, the Quilled Suture: which is made by ſplitting each end of the ligature, (after the ſtitches are made), into two threads; then laying a quill or bougie along each ſide of the wound, we tie all the ligatures of one ſide round one bougie; then draw that bougie

wound of the belly; and the Intro-raphia, when they ſewed a wounded gut.—They had particular needles for ſewing tendons; they had the diſtinctions of Sutura Sicca, and SuturaCruen ta, the moiſt and dry ſutures; i. e. the bloody ſutures in which they uſed the needles, and the dry ſutures in which they uſed only plaſters. But the moſt abſurd and dangerous of all their ſutures, was what they choſe to call the Reſtrictive Suture, (or rather they gave the general name of reſtrictive ſuture to all cloſe ſutures), intending by the cloſeneſs of their ſutures, not only to cloſe the wound, but to bind it ſo firm as to prevent the bleeding from any large veſſel within the wound. Their reſtrictive ſutures were as abſurd as the expectation of the firſt inventors of the flap amputation were, who ſewed their large flaps of ſkin, not to procure a more ſpeedy cure or a fleſhy ſtump, but to prevent the bleeding; for which purpoſe they bound down the flap upon the face of the ſtump, and kept it there with buckles and belts, and all kind of machinery.

tight down, by pulling the ligatures from the other ſide; then tie the ligatures alſo on the other ſide, round the oppoſite bougie; ſo that the two bougies, like two large rolls, keep the ſides of the wound neat and even. The preſſure is downwards towards the bottom of the wound, at leaſt, it extends as deep as the ligatures; ſo there is leſs need for helping this ſuture with compreſſion; but we may ſtill put our ſticking plaſters in the interſtice of each ſtitch*.

7. But there is a degree of prudence in refraining from ſtitches in deep muſcular wounds; for ſtitches, after all, can ſupport only the edges of the wound, while it is the compreſs and the uniting bandage that muſt ſupport all below. Deep muſcular wounds, then, ſhould be ſecured chiefly by the compreſs and uniting bandage. Stitches ſhould, in ſuch wounds, be uſed with reſerve. Thoſe who have uſed ſtitches the moſt confidently, have been forced, as ſuddenly, to cut them out again. —A point which is well illuſtrated by the caſe of a ſoldier, who, being wounded at the corps de garde with a ſabre-cut acroſs the ſhoulder, through the belly

* This is not exactly what was meant by the older ſurgeons when they uſed this quilled ſuture; for they ſuppoſed that a deep muſcular wound could not ſafely be brought together; they wiſhed to bring it together at the bottom, but were afraid to cloſe it at the mouth, leſt that ſhould confine the matter. They uſed the quilled ſuture with this intention, as beſt contrived for cloſing the bottom of the wound without ſtraitening its mouth; for the thread goes down to the bottom of the wound, but the bougies are far from the mouth, the threads in this, as in every ſtitch of the ſurgical needle, being always brought through the ſkin an inch diſtant from the lips of the wound.

of the deltoid mufcle, his furgeon fewed the wound that night, with many deep ftitches; thefe M. Pibrac was next morning obliged to cut, on account of convulfions of the arm, which ceafed the moment that thofe cruel ftitches were undone*.—Such deep futures may be fairly enough compared with the crofs ftitch of Paræus, which killed the patient; fometimes by convulfions, fometimes by high inflammations, with a total gangrene of the ftump.

8. There is alfo a degree of prudence to be obferved in ufing ftitches in unhealthy patients, where we are almoft affured, that the parts cannot adhere; or in foul hofpitals, where all kinds of wounds are apt to fall into a foul eryfipelatous inflammation, of the low and gangrenous kind. For ftitches muft always, by exciting high inflammation, do much harm, whenever they do not do immediate good.

9. Whether the wound be broad in form of a flap, or long and deep, or a penetrating wound, there is much danger, left the fides of fuch a wound be not kept in clofe contact; in fuch wounds we lay long or flat compreffes along the tract of the wound, keeping them firm with a broad and firm rolled bandage, (what long ago they called the Expulfive Bandage), which both prevents collections of matter, and brings the fides of the fore into contact. And every furgeon, knowing the intention, muft have ingenuity enough to fhape his compreffes long or flat, or round or fquare, according to the form of the wound, and to draw his bandage tighter juft as the occafion requires.

* Mem. de l'Academie de Chirurgie.

10. In deep mufcular cuts, where there is bleeding, and confiderable veffels are wounded, we firft apply the tourniquet, then tie the arteries; then undo the tourniquet to fee that the arteries be really fecured; then fcrew the tourniquet again, that not even an oozing of blood may interupt our next operation, viz. the clofing of the wound; then few the wound according to its nature, or its fize, leaving the ligatures of the arteries hanging from a corner of the wound; and though perhaps the whole will not adhere, yet much will adhere; we always have our chance of a total adhefion; the ligature keeps a little part open for itfelf, with a little fuppuration round it, but attended with no pain; and it comes eafily away the fourth or fifth day *.

* "The way," fays Wifeman "to ftop the bleeding, as it is common in all wounds, is by bringing the lips of the wound clofe together by future, and by applying fuch mendicaments to them as have a drying and agglutinative faculty."—Thefe notions our older writers got from the celebrated French furgeon, Guido de Cauliaco, who fays, "Sutura reftrictiva fit, quando aliæ futuræ non fieri poffunt propter magnum fanguinis impetum."—And he adds, that this, after all, is not a future to be depended upon; for if but one ftitch burft, the whole gives way;—"Sufpecta tamen eft, quia rupto uno puncto, cetera relaxantur."

Guy de Chauliac had in his turn copied from the Arabians in moft points, and very exprefsly in this bufinefs of futures; fo that we find this bufinefs of the reftrictive futures to have begun with the Arabians, who knew the way of ufing needles in clofing wounds, but had not learnt to ufe the needle in tying arteries, otherwife than by fewing the wound juft fo much the clofer and tighter in proportion to the bleeding; they directed the future to be made clofe and firm, like that fu-

11. Even though the bone be wounded or cut up, this ftill makes no change in our intentions, nor in the furgery of the wound; for the bone alfo may adhere, and perhaps the re-union proceeds thus: We put down the bone and cover it with the fkin in clofe contact, and the fkin adheres; the bone itfelf, moft probably does not, in the ftricteft fenfe, adhere; or at leaft, its adhefion is different in its period, and in its manner, from that of the fkin, and yet it is like it; for the outward wound is healed, the wounded bone throws out its mucus, that mucus becomes vafcular, then bone is fecreted; then a kind of callus is formed to heal the cut bone: and all this procefs going on within! The bone feems to have adhered at the very time of the adhefion of its foft parts. But it is very particular, that in all fractures, great as well as fmall, and of courfe, in all wounds of the bones, the bone never heals, till the outward wound is firft healed, fo as to reftore the continuity of the veffels, and enable them to begin the fecretion of new bone. However the theory fhall ftand, it is comfortable to be thus affured of the fact; that if a bone be wounded or cut, fo as to be turned up, or though a piece be cut away

ture which the currier makes, when he mends breaches in the tanned fkin.

This is the true hiftory of one of our futures, and the reafon of its two names, viz. Reftrictive and Continued Suture; and from this hiftory it may be underftood, that even the name fhould be no longer heard. As for the other ufe and reafon which furgeons have affigned for retaining this future, viz. that of fewing the cut inteftine clofer, that fhall alfo be difcuffed in explaining Wounds of the Belly.

from a bone, if that piece ſtill preſerve its connexion with the ſoft parts entire, it may ſtill adhere, live, and be reſtored. And the general wound may be made to adhere as firmly with a cut bone in it, as if it were a ſimple cut. How otherwiſe could we make the ſurfaces of an amputated ſtump adhere, it being the largeſt wound, having in it the largeſt cut bone?

12. The laſt direction which I have to give you, relates to the approach of inflammation; for I cannot allow myſelf to call it inflammation, when the part adheres; this indeed were no better, than to call a cure a diſeaſe.

The adheſive inflammation, (as it is called inflammation), is not attended with fever, pain, ſwelling, nor redneſs, unleſs in the moſt trivial degree; indeed that gentle ſwelling which indicates the fulneſs, and ſtrong but healthy action of the veſſels, it muſt have; but the increaſed action of thoſe veſſels, in re-uniting the lips of a wound, ſtands on the ſame footing with the healthy action of veſſels, in forming or in ſupporting any part of the ſyſtem. A bone is formed and completed by the action, fulneſs, and turgeſcence of thoſe arteries which are deſtined to form it; a ſpoiled bone is regenerated by an increaſed action and fulneſs of thoſe veſſels; the callus, which re-unites a broken bone, is formed by a full, but ſlow and regular action of thoſe arteries, which extend from the ends of the bone, and meet each other; and whenever veſſels extending either from the ends of a broken bone, or from the edges of any wound in the ſoft parts, meet each other, the

part is entire again; they form a perfect ſyſtem of circulation; and thus from the very firſt moment of adheſion the veſſels begin a healthy action, unaccompanied with inflammation or pain; and the part is once more entire, and ſound. If the veſſels become thus entire from the very moment of their re-union, if neither pain nor inflammation come on, unleſs the proceſs fail, and the veſſels begin to part, how can this be called a diſeaſe? or, by what ſophiſtry can it be comprehended under the definition of an inflamed part? To ſpeak thus appears to me, to give an incorrect and unfavourable view; it is to deſcribe the cure, by the very name of the only diſeaſe which can interrupt the cure. I muſt therefore conſider the part as going on in a ſound action while it continues to adhere, and ſhall proceed in deſcribing what is to be done if the wound ſhould begin to ſeparate and open; or in other terms, ſhould begin to inflame.

Adheſion prevents inflammation; when the parts adhere, they enter into a healthy action, they are entire, and they do not inflame; whenever any part is not in contact, and does not adhere, it muſt inflame; whenever one part is left thus ſeparate, its inflammation may extend to the adhering part of the wound, and ſo one detached point may endanger the whole. The ſtitches are themſelves a cauſe of inflammation, (which again is always the cauſe of the opening and burſting of the wound); and ſo the inflammation around the pins or ſtitches, endangers the whole. If the ſtitches be too tight pulled, this bracing up of the ſtitches inflames the wound; and ſometimes the timely undoing

of the ſtitches, prevents this opening of the wound; if there be blood poured out under the wounded part of the ſkin, it ſeparates the ſkin from the parts below, which is exactly equivalent to the ſeparation of the edges of the wound itſelf:—that alſo endangers the whole. From all which you will conclude, that the moment you obſerve pain, inflammation, and ſwelling of the wound, a ſeparation or gaping of its lips, the ſtitches tenſe, and the points where the ſtitches paſs particularly inflamed, you ought to undo your bandages, draw out your pins, or cut your ſtitches, and take away every thing that is like ſtricture upon the wound; theſe prudent meaſures may abate the riſing inflammation, and prevent the total ſeparation of the ſkin; while you may ſtill endeavour to keep the wound tolerably cloſe, by the more gentle means of ſticking plaſters.

But ſhould the inflammation riſe ſtill higher, and ſhould you perceive that a total ſeparation and turning out of the wound is inevitable; you muſt throw all looſe, put a large ſoft poultice round the whole, and forſake, without heſitation, all hopes of procuring adheſion; for ſhould you, in this critical juncture, perſiſt in keeping the parts together with ſutures, the inflammation would, in the form of Eryſipilas, extend itſelf over the whole limb, attended with a fetid and bloody ſuppuration, waſting the ſkin, with great loſs of ſubſtance. Therefore, throw all looſe, apply your poultice, allow the wound to ſeparate right as it is, and to paſs ſlowly into a ſoft and eaſy ſtate of ſuppuration; and then, a ſecond time, try to bring the edges up to

one another, not by ſtitches, but by adheſive ſtraps, or by a gentle bandage.

When the wound has fallen into a full ſuppuration, then the ſuppuration, granulation, and all that follows, belong (as indeed adheſion alſo does), to nature alone; over which we have no other power than that of ſupporting the action of the parts, i. e. keeping the ſyſtem in good health: and when the ſuppuration goes wrong, it is, in general, by taking the form of a profuſe thin gleety diſcharge; and this profuſe diſcharge is to be ſuppreſſed, and the right ſuppuration reſtored by bark, wine, rich diet, and good air: and this is what is uſually meant by ſupporting the ſuppuration, or moderating the profuſe diſcharge.

DISCOURSE II.

ON WOUNDED ARTERIES.

OF all the ſudden accidents which demand the aſſiſtance of the ſurgeon, no one requires ſuch abſolute preſence of mind, and ſuch perfect knowledge of Anatomy, as the bleeding from any great artery. I cannot conceive how a man of real feeling can, in our profeſſion, paſs one compoſed or eaſy hour, without knowing thoroughly the courſe and value of the great arterial trunks. Without this preparation, the ſurgeon lies continually expoſed to accidents, which may, in a ſingle moment, ruin his profeſſional character, and blight all his faireſt proſpects of ſucceſs. Without this knowledge of the blood-veſſels, a modern practitioner is much in the condition of thoſe who lived in times before the needle was invented, when the ſurgeon durſt not cut the moſt trifling tumor, or did it with fear and trembling; when often an operation apparently eaſy, coſt the patient his life. But with a due preparation, even the youngeſt ſurgeon now knows how to ſpeak in conſultation, and how to perform his operations; where to be afraid, and where to venture

upon a bold and refolute thing. The greater operations are eafily done, while the crofs accidents of practice, the wounds of arteries, the confultations about aneurifms, and other confultations about organic difeafes, are the only proper tefts of the furgeon's fkill.

Even the few directions which I fhall be able to give in this fhort difcourfe, will bring this appeal to bear ftrongly upon your minds, and will vindicate any thing that I might choofe to fay, either in reproof of negligence, or in praife of diligence, in regard to this the moft important of all ftudies, the ftudy of the blood-veffels! to which Haller and Petit, the greateft mafters in anatomy and in furgery, had devoted fo much of their labour.

The chief queftions in this interefting fubject, are thefe:

1. What is the real importance of a GREAT ARTERIAL TRUNK in any limb? and what is the true value of its leffer branches, of its inofculating arteries, of thofe intricate connections, which, in accidents of the main trunk, enable the fmaller branches to fupply and nourifh the limb?

2. What is the form which a wounded artery affumes? how is it covered? What parts form that bag which we call an ANEURISM, and which, both from the danger of its burfting, and our fear of gangrene, is confidered as a moft dangerous difeafe? How may the operation, in this wound of a great artery, be moft fafely performed?

3. Or fince, even by bleedings from the SMALLER ARTERIES, our patient fometimes dies; how fhould we

manage these smaller arteries? The needle, the compress, the sponge, the styptic waters, are all of them used, rather, as it should seem, according to the fashion of the day; or to mere accident or caprice: But are there not certain accidents, or certain parts of the body in which each of these will be found more or less serviceable, according to fixed and steady rules?

I believe these to be the chief questions; and if, in the course of these instructions, I should try to teach you your duty according to settled rules, they must be rules belonging rather to the general point of wounded arteries than to the surgery of particular wounds; whatever general rules I now venture to lay down, you must learn by your own prudence and good sense, to apply according to the accidents and circumstances of each individual case.

OF THE ANATOMY OF THE GREAT ARTERIAL TRUNKS AND OF THE TRUE VALUE OF THEIR INOSCULATING ARTERIES.

In the managing of bleeding-vessels, the surgeon is not only vexed with the difficulties of tying the bleeding-vessels, but his mind is discomposed with fears and doubts about his success; and surgeons, who are old in practice, and should know where the danger is, always put this aphorism at the head of their most interesting chapter: "When the brachial or femoral artery is wounded, though the patient should not perish by the hæmorrhagy, the limb must soon die for want of nourishment *." And further, to excite the fears

* Gooch, p. 71.

of the young furgeon, he is told, "That in fuch cafe, the progrefs towards putrefaction will be very fwift." "A wound of this kind, very generally requires amputation;" and of courfe, not one precious moment is to be loft in delay. If this were the right and legitimate conclufion, my directions about the bleeding from dangerous wounds, fhould end with a few fimple directions about tying arteries with the needle, or in difficult cafes, thrufting down a piece of fponge into the wound! But I am perfuaded, that it is our duty in all fuch cafes, to tie up even the great arteries of the thigh or arm, clofe to that very point where they come out from the body, and I hope to fet up an aphorifm, at the end of this difcourfe, the very reverfe of that common rule with which it begins.

This important queftion refts upon two points only; the anatomy, and the facts: and although we might, by tracing the arteries of the thigh, fatisfy ourfelves that the inofculations are fufficient, where its great artery is wounded, to fave the limb; yet we can be affured of this only by facts.

The hiftory of this piece of ftudy, viz. the inofculations of the femoral artery, is indeed very curious; for nothing furely can be more furprifing than to obferve furgeons, interefted as they are in knowing fo great an artery thoroughly, difputing every day the queftion of its inofculations, nay, what is worfe than all, in the daily practice of cutting off limbs, fearing left thofe very inofculations fhould not be fufficient to fupport the limb; contenting themfelves with talking about it merely, not knowing, by actual diffection, whether there

be two great branches of the femoral artery running down the thigh, or one only.

The anatomy of the femoral artery is ſimply this: The great artery, before it emerges from the belly, and while it ſtill retains the name of ILIAC ARTERY, divides into two great branches;—the INTERNAL ILIAC, or Hypogaſtric Artery, which deſcends into the pelvis; and the EXTERNAL ILIAC, or Femoral Artery, which goes downwards along the thigh.

Of the INTERNAL ILIAC or Hypogaſtric Artery, the chief branches go out from the pelvis, through the ſciatic notch, or through the thyriod hole; they eſcape from the pelvis, go round among the glutæi muſcles, and play about the joint of the hip, holding large communications with the uppermoſt arteries of the thigh.

The EXTERNAL ILIAC or Femoral Artery, having gone down from the belly, and emerged from beneath the crural arch, deſcends into the thigh. Its firſt buſineſs is to furniſh the thick muſcles and fleſh of the thigh itſelf; about four fingers breadth, therefore, below the abdomen it forks into two great arteries, equal in ſize; one deſtined for the leg, and one appropriated to the thigh. That which belongs to the thigh, plunges immediately into the thick fleſh of the thigh, ſending branches upwards towards the hip-joint, and downwards towards the knee: from its going thus deep, it is named the PROFUNDA FEMORIS; from its ſpreading itſelf among the muſcles, it was known among the older anatomiſts under the name of the MUSCULAR Artery of the Thigh. The main trunk of the artery, having given off this profunda, lies ſuper-

ficially along the thigh; gives none but the moſt trifling branches to the muſcles of the thigh; goes down to the leg unexhauſted; and its chief peculiarity is, that having deſcended into the ham, it gives off branches of the ſize of a crow-quill, three in number, which play round the knee-joint, and are named from this circumſtance, the ARTICULAR Arteries of the Knee.

Here, then, the firſt thing that ſtrikes our eye is that this artery, lying ſo much nearer the ſurface, and going downwards towards the leg, ſhould be named, not FEMORAL, but CRURAL ARTERY; while the profunda or deeper artery, ſince it plunges among the muſcles to nouriſh them, is the right and proper artery of the thigh.

The next thing to be obſerved is this, that the arteria profunda, being as big as the femoral artery, ſupplying the whole fleſh of the thigh, running upwards towards the hip-joint, and downwards towards the knee, muſt have large inoſculations; and if it can draw blood enough from above, will eaſily tranſmit it to the lower parts:—in ſhort, that ſo great a trunk as this muſt be quite competent to the nouriſhing of the thigh.

But this concluſion is of too much importance, to be allowed to float thus looſe and unſettled in the ſurgeon's mind. It is not enough, that he thinks and believes that the artery will anſwer this great purpoſe; nor that he hopes to ſave the limb; that at leaſt he may try:—He muſt not only think himſelf entitled to tie the artery without blame, but he muſt be able to do ſo confidently

and boldly, and with great hopes of ſucceſs. To acquire this ſtate of mind, he muſt not linger in this kind of heſitation; he ſhould ſee and examine the preciſe arteries from which he is to expect a cure. And the neceſſity of ſuch an examination appears more ſtrongly, when we ſee ſurgeons of the greateſt experience, directing that every limb wounded in the great artery, be cut off*.

When we examine the branches of the Profunda, we find the Profunda lying a great inoſculating trunk, betwixt the arteries of the pelvis and the arteries of the knee; its firſt branches turning up to meet the arteries of the pelvis; its lower branches turning downwards to meet thoſe of the knee; ſo that although the proper office of this artery is to nouriſh the thigh, one accidental, but yet important office of it is, to inoſculate with other arteries. Thus, by theſe conjoined offices, the economy of the limb is perfect; the limb is nouriſhed during health; and it is ſupported by new circles of blood, when any accident touches the great trunk.

* That theſe ſlight deſcriptions of the arteries, and the arguments which proceed upon them, might be intelligible, I deſired my pupil Mr. Mochler to cut up the fore part of the thigh, and ſhow the place where the Profunda goes off; and next, to be at ſome pains in diſſecting out the whole line of the artery, and laying it out upon a board; from theſe two ſteps of the operation, I have drawn the two plates, but ſtill they are to be conſidered only as haſty ſketches; ſufficient for illuſtrating this point, but not abſolutely correct. The one repreſenting, in the form of a drawing, the place of the thigh at which the artery forks; the other repreſenting, in the form of a plan, the general tendency of the inoſculations.

The anatomy of the Profunda may now be cleared in two ſhort ſentences:——Firſt, The two uppermoſt branches of the Profunda go off from the very root of the artery, almoſt touching the great Femoral Artery; they are very large; they turn quick and ſuddenly round the hip-joint; they are named the CIRCUMFLEX Arteries of the hip-joint; and both theſe arteries inoſculate upwards with the arteries of the haunch, which come from within the pelvis:——Secondly, The Profunda has uſually three great branches running downwards, among the muſcles of the thigh; they go through among the muſcles, and of courſe perforate from the fore to the back parts of the thigh; theſe again are called the PERFORATING Arteries: they inoſculate downwards with the articular arteries of the knee.——Thus, in this ſlight ſketch, is chalked out the propoſition, which I mean to eſtabliſh more fully, viz. That the profunda lies as a great inoſculating trunk betwixt the arteries ſurrounding the hip joint, and the articular arteries of the knee; that the Femoral Artery being hurt in the middle of the thigh, the profunda will, through its lower branches nouriſh the leg; and that the External Iliac Artery being wounded even at the groin, the arteries within the pelvis will preſs their blood upon the upper branches of the Profunda, ſo that in like manner, thoſe upper branches of the Profunda ſhall nouriſh the thigh.

It is ſtrange, I ſay, that ſurgeons ſhould have continued merely talking about this artery, or making experiments upon animals, more idle than even the mere conjecture and common report. The great Veſalius

ſcarcely know the Profunda; we ſee it indeed in his plate, but we ſee it only becauſe we know it, for though it is marked (ψ. χ.) and though it is ſeen inoſculating with the arteries of the pelvis, it is neither drawn truly nor well explained. But ſtill Veſalius obſerves a very large anaſtomoſes with the thyricd artery, marked (ω). Vid. "Integra totius magnæ arteriæ delineatio."—Yet Veſalius's drawing, or plan rather, is much worſe than that of Euſtachius; for in Euſtachius's 15th Table, though we find the Profunda marked it is not characterized with any of thoſe inoſculations, which give it its chief importance in the eye of the ſurgeon: nor is it deſcribed at all even in the explanations of the careful Albinus, who ſhould have put down T. figure 15, as the great "Arteria and Vena Profunda femoris," going down together into the fleſh of the thigh. In Verhein, again, this artery is repreſented; it has its true proportions to the great Arterial Trunk, but it is repreſented as one long and ſimple branch, not having that importance, nor thoſe wide inoſculations, which conſtitute its chief character.——Next comes Heiſter, who blames all former authours, Verhein excepted, for having forgotten this important branch, which after all, ſays Heiſter, "is not ſo very rare *."

* "Huic tanto magis miror, quod multi magni anatomici nullum prorſus mentionem facerint: cum tamen non ſit adeo rarus," p. 142. "Fere omnes anatomici, Verheyeneo excepto, unicum tantum truncum et arteriæ cruralis et brachialis delinearunt, ut videre eſt in Euſtachii, Veſalii, imo et in recentioribus præſtantiſſimis anatomicis, Cowpero ſcilicet," p. 149. Let any man, who knows what the Profunda ſhould be, look to Cowper's third Table in his Appendix to Bidloo,

But it may indeed be ſaid, that all authors knew it, while Heiſter was ignorant of it, a paradox which is eaſily proved; for Veſalius, Euſtachius, Verhein, Cowper, all marked it very diſtinctly, ſome with more, and ſome with leſs accuracy; yet as their drawings were intended as plans of the arterial ſyſtem, it is implied of courſe, ſince they did draw it at all, that they underſtood it to be a regular and conſtant artery; while Heiſter knew it only as an accidental artery. Heiſter began a miſtake, which did not end with himſelf; and which muſt have produced much confuſion and apprehenſion in the ſurgeon's mind; for having cured a ſhoemaker, who in dropping his paring knife, had ſtruck his knees together to catch it, and wounded the Femoral Arterry, Heiſter explains his opinion of the caſe, in the following terms: "If there be only one arterial trunk in this limb, as often happens, neither the compreſs nor ligature, nor any thing but amputation, can ſave the patient's life. The limb muſt fall into abſolute gangrene*." And ſo his conſultation proceeds in theſe terms.

and he will there find the drawing of the Profunda, marked 70, nearly perfect, at leaſt as good and as diſtinct as any other artery in his great plan of the aorta, and more correct than Verhein's. This much is allowable in favour of our great Engliſh ſurgeon, who has been enough accuſed. Vid. Gulielmus Cowper, citatus coram tribunale Nobiliſſ. Ampliſſ. Societatis Britann. Regnæ.

* Imo, ſi forte non niſi unicus arteriæ cruralis truncus hoc in femore adeſſet; ſicut ſæpe obſervari ſolet, ſubinde ne ligatura quidem arteriæ læſæ ad ſanandum hoc malum ſufficeret, quia tunc partes infra ligaturam poſitæ, ob ſanguinis arterioſi hac ipſa ſublatum influxum ſphacelo corripi ſolent, ita ut æger tunc ſine ablato crure ſummoque vitæ diſcrimine ſervari non poſſit.

——First, To try what can be done by a compress and bandage; as if he had believed it possible to heal the artery, whereas, compression, whenever it suppresses bleeding, must do so by obliterating the cavity of the wounded artery. Next, He advises, if the compress do not suffice, then to open up the wound, and tie the artery; and, as if the tying of the artery obliterated the trunk more fairly than the compress; he adds, "But if, having tied the artery, there should chance to be but one great trunk;" "Imo, si forte non nisi unicus arteriæ truncus adesset," the leg must be cut off; otherwise the leg will mortify, and the patient must die.

And Heister not only explains himself thus upon an occasion, in which he was particularly interested to understand the Femoral Artery thoroughly; but he adds to his practical observation, and to his undigested criticisms of Vesalius, Eustachius, and Cowper, a history of the Femoral Artery, worse in all respects than that of any anatomist who had gone before him; for he says: ——"The Crural or Femoral Artery most commonly descends through the whole thigh, quite to the knee, in one single trunk, giving only very trifling branches to the great muscles of the thigh to nourish them," p. 141. —"But nevertheless it does sometimes divide in the upper part of the thigh into two great arteries*."

* "Descendit arteria cruralis seu femoralis unico tantum plerumque "trunco, per femur totum usque infra genu, et utplurimum tantum "minores ramulos ad musculos vicinos prægrandes nutriendos spargit," p. 141.

Interea tamen subinde in suprema fæmoris parte, in duos magnos quasi truncos se dividit, p. 142.

It is from notions like these that Heister allows himself to say, "If in this case, (as often happens), there should be one great trunk only;" when in fact, it were as difficult to find a thigh without a Profunda, as without a Femoral Artery.

But this mistake of Heister did not end with himself: there is another surgeon of the present day, who is guilty of calling this a lusus naturæ, and of comparing it, like Heister, with the high forking of the Humeral Artery.—Mr Gooch mistakes this Profunda, calls it an accidental branch, a lusus naturæ, an accident similar to the high forking of the Humeral Artery; he does not indeed clench it with Heister's direct affirmation, "Scilicet sæpe observari solet;" but he writes a paper in the Philosophical Transactions, to inform the world of this interesting discovery, That he had seen three times a double artery in the thigh. The terms in which Mr Gooch describes this discovery, which he made while performing an amputation, and which he thought might turn out so interesting in consultations about aneurisms of the thigh, are these:

"In this amputation we observed a division of the Femoral Artery into two trunks of equal size running parallel. And so near together as that we could conveniently include them in one ligature with the needle, avoiding the nerve, after raising them up with the dissecting forceps by a small portion of the connecting cellular membrane; and here we found no occasion to take up any other vessel." Philos. Trans. An.

1775.—His amputation was particular only in this, that he had cut the thigh higher than ufual.—" The two great trunks lying parallel, and equal in fize to each other," were the Femoral Artery and the Profunda, and where he tied in one great ligature, both the Femoral Artery and the Profunda, there was no great wonder that he found no other bleeding arteries. Thefe are the only peculiarities that I can fee in this amputation, and I dare fay, his other amputations were very like this. When fuch an author proceeds, in the next part of his paper, to retail to us his experiments made (with the help of a famous Farrier) upon horfes and dogs, it is very allowable to fay, that fuch experiments were more idle than even the mere conjecture and common report. And furely, when furgeons three years ago*, could venture to tie the Femoral Artery fupported by no better hopes than this; we, knowing the Profunda, and all its connections with other

* The celebrated Profeffor Murray fays, " I never could find this fame double artery in the thigh, which Gooch pretends to have found three times, and believes to occur very often." " Nec unquam mihi arteriam femoralem fuperficialem duplicam videre licuit, qualem celeber, Gooch fe ter obfervaffe contendit," &c. p. 44. No wonder that Murray never found any fuch thing, for Murray knew what the Profunda was, and perhaps was not fo well acquainted with the Englifh language, as to underftand that Mr Gooch was calling the arteria profunda, a lufus naturæ, a double Femoral Artery, &c. and was looking out for it in horfes and dogs. That Gooch did not know the Profunda, is plain from this, that he never once mentions it in his Surgery, nor in his Royal Society paper. Mr Gooch's opinion, and indeed his experiments, are repeated in that edition of his Surgery, which was publifhed in 1792.

veſſels as we do now, ſhould be very bold in tying the artery very freely, not only in the thigh, but even in the groin.

But the proof of this muſt be wrought up to a greater degree of certainty, for it reſts upon two points, the reaſoning from anatomy, and the final authority of facts; and however ſtrong our perſuaſion might be, that the patient would recover, though the main artery of the thigh were tied; yet until we abſolutely ſee one patient at leaſt recover from ſuch an accident, our opinion is ſtill little removed from that vulgar notion, which is implied in ſuch expreſſions as theſe; "We reſolved to try whether the limb might not be nouriſhed by the inoſculating arteries." This heſitating timorous language is uſed even at this day, when we have the moſt certain proofs of this very intereſting fact; for it has been tried, and it has ſucceeded alſo, to a degree which our reaſoning from anatomy could hardly have led us to expect.

The operation for aneuriſm of the ham, or aneuriſm in the middle of the thigh, never fails from want of a free circulation; though, no doubt, it often does fail from another cauſe, for ſo great an Artery is not eaſily commanded; it is not compreſſion nor even ligature, that will always do; and this great artery often burſts out. Many patients have died ſuddenly in the night, many alſo have died of ſucceſſive bleedings, which the ſurgeon could neither prevent nor ſuppreſs; while death from gangrene has been extremely rare.

I think I am ſafe in ſaying, that in all caſes where our ligatures can command the artery, our patient is ſafe;

which is tantamount to ſaying, that wherever we can force the blood towards the inoſculating arteries, they enlarge: and operations for popliteal and femoral aneuriſms, for aneuriſms in the ham and thigh, have ſucceeded ſo often, both in recent accidents, and in old diſeaſes, that on this point, we need have no fear; I need not labour to prove to you a thing ſo generally known. But it is of importance towards giving you confidence in all accidents and difficulties, that I explain to you how poſſible it is to tie the artery in the groin, and ſave the limb; an argument which I enter upon the more willingly, as it includes, à fortiori, the doctrine of all lower wounds.

When we obſerve the free inoſculations of the Profunda, with the articular arteries of the knee, we are encouraged to tie the Femoral Artery anywhere below the root of the Profunda; and ſeeing that it is the Profunda which ſaves the limb, we tie the artery in the thigh, as freely as in the ham. We are encouraged by theſe ſlender inoſculations round the knee joint, to tie the artery anywhere below the giving off of the Profunda, and when we compare with theſe, the high inoſculations formed by the upper branches of the ſame Profunda, aſcending and encircling the more fleſhy joint of the hip, we need not want courage alſo, to tie the artery in the groin. Theſe upper inoſculations, belong to an order of arteries large in proportion to the limb they nouriſh; juſt as the arteries of the knee are delicate, in proportion to the ſmallneſs of the leg; and I am perſuaded, that in good time, the accidents of practice, and the boldneſs of the ſurgeon, will

make our apprehenſions about ſucceſs in this caſe appear as childiſh as the notions of the older ſurgeons, who had their amputation inſtruments in good order, whenever they ventured to operate for aneuriſm in the arm.

Guattani was called to attend a young man, who had an aneuriſm of the Iliac Artery, at firſt ſmall and limited to the groin, lying cloſe up under the ligament of the thigh, ſeeming indeed to come from within the pelvis. But ſoon after Guattani had begun to apply his compreſſes, (viz. in one month after), and while the tumor ſeemed yielding to the compreſſion, it burſt ſuddenly during the night, with intenſe pain, ſo that they were obliged inſtantly to cut the bandages and give him relief; then immediately the blood puſhing forwards among the cellular ſubſtance which ſurrounds the pſoas muſcle, produced ſo ſudden an enlargement of the tumor, that Guattani at next viſit, ſaw that all hopes of a cure were now at an end. In a few days more the tumor filled the whole of the hypochondrium, came plainly from within the pelvis, and going along the groin, extended quite to the middle of the thigh. With this prodigious tumor beating ſtrongly, and filling the thigh and haunch both within and without, the man lingered for three or four weeks, and then died. "This caſe," ſays Guattani, "excited in me a great deſire of inveſtigating the whole courſe of the Femoral Artery;" and in this inquiry, we find Guattani diſcovering and proving more than he himſelf knew of, and much more than the celebrated Murray will allow; for Murray ſays, "although Guattani was able

to inject tepid water, tinged with yellow from the arteries of the pelvis, round into the arteries of the leg and thigh; yet I suspect strongly that the grosser fluid, the blood, would pass through the same channels more difficultly, nay so sparingly as not to nourish the limb *.

But the fact, as it stands in Guattani, is this: First, He found by dissecting, in going carefully along the course of the femoral artery, that it was straitened from the groin down to the ham, where it was almost obliterated. " I thought, indeed, says Guattani, that the Popliteal Artery was absolutely obliterated, till by examining more carefully, I found that it could just receive one of Anell's wires †." Now, since Anell's wire is no bigger than a bristle, may we not say that it was obliterated, that no blood passed that way, that the limb had lived from the time of the bursting of the aneurism, and during the gradual obliteration of its great artery, only by the inosculations along the back part of the thigh.

Secondly, Guattani found, by the injection of tepid water tinged yellow, that the blood had gone round by the branches of the Gluteal, Sciatic, and Pudic Arteries; that, in short, it had gone round by the arteries

* " Licet enim ex Cel. Guattani experimentis constet, aquam colore flaveo tinctam et calefactam, si arte in Arteriam Iliacam internam pellitur, arterias femoris larga copia penetrare, hisque abscissis ex minoribus ejus surculis abunde defluere; vereor tamen ne liquor crassior qualis sanguis est, multo difficilius easdem pervadet vias, vel latices hujus vitalis portio ægrius transmissa in sufficiens præbeat membri nutrimen."

† Sed re accuratius inspecta, cognovi, tantum in arteria cavi relictum, esse ut Anellianum specillum posset admittere, quamvis id ægre fieret, &c.

from within the pelvis surrounding the hip into the Tibial and Fibular Arteries below the ham.

This is the most singular fact in the whole pathology of aneurisms; for the blood which had nourished this limb had moved not only through the common inosculations round the hip joint, but it had gone by the most circuitous course, and to finish its circle, the blood must have passed through three series of inosculating vessels: Thus, the blood came not from the upper inosculations of the Profunda into the trunk of the Profunda, and so round the haunch by a short circle, into the great artery of the thigh, but must have proceeded first through the Gluteal and other Arteries of the Pelvis into the Articular Arteries of the hip; then from the Articular Arteries of the hip into the Profunda, which is their parent trunk; then it had gone down from the main trunk of the Profunda along those lower branches of the Profunda, which are named its Perforating arteries; then from these the lower extremities of the Profunda it had passed into the Articular Arteries of the knee, and by this last inosculation the blood once more had access to the trunk, *viz.* to the Popliteal Artery, where it divides into arteries for the leg. In short, it had happened in this case, as must always happen, that the smaller arteries grew stronger in both functions at once, *i. e.* that the arteries turning round the hip were both so much increased in size as to be able to carry a sufficient quantity of blood for nourishing the thigh; and their inosculating extremities also were enlarged in like proportion, so as to transmit a sufficient quantity of blood for nou-

riſhing the leg. The blood had paſſed all along by theſe veſſels which lie upon the back part of the thigh, leaving the Proper Femoral Artery dry of blood, and almoſt cloſed all the way from the groin, or rather from within the pelvis, down to the ham; and I call upon Murray, with all his knowledge of the blood-veſſels (and no other man knows ſo much about them as he does), to point out any other paſſage for that blood by which the limb continued to live.

Another thing alſo deſerves notice in this very intereſting caſe, *viz.* that in their natural and undilated condition, the arteries round the haunch will not tranſmit the blood thus freely, even through one inoſculation, much leſs through three ſucceeding ſeries of inoſculating arteries; and this circulation of the yellow water uſed by Guattani was thus free, merely on account of the gradual dilatation of the arteries in this diſordered limb: For Guattani after this made an experiment upon the arteries of a ſound limb *, which explains to us how vaſt the difference is betwixt the

* Guattani does not mark the difference betwixt his experiment and his diſſection; but his experiment was this: Firſt, He placed his injecting tube above the Hypogaſtric Artery, then he tied the Femoral Artery in the groin, and threw in his injection, and it went round eaſily into the Profunda Femoris; which he explains by ſaying, "More ſatis copioſe perfluxit." Next, He made another ligature upon the great artery in the ham, imitating the obſtruction in this caſe of aneuriſm, and he forced the injection round in a ſecond inoſculating circle, *viz.* by the Articular Arteries of the knee, where of courſe the injection was a little retarded, but ſtill flowed out indeed, "liquorem ſane effluere conſpexi," but infinitely leſs eaſily, "ſed "longe lentius, parciuſque."

condition of arteries in an aneurifmal limb, and in a found one *.

Thus, the conclufions are thefe :

1. That a fine injection of coloured water, which will not pafs through the veffels of a found limb, will circulate freely in the dilated veffels of an aneurifmal limb.

2. That not this yellow water only, which Murray fpeaks fo lightly of, but alfo the circulating blood, will pafs freely all the way from the arteries within the pelvis to the artery in the ham; for this leg lived a month after the burfting of the aneurifm, during which time the inofculating arteries continued enlarging and the great trunk contracting, till at laft the trunk was entirely obliterated, and the inofculating branches carried all the circulating blood.

3. That we are fafe not only in tying the artery in the thigh, but in tying it in the groin; for in this cafe the blood came down by the back part of the limb. The arteries were obliterated upon the fore part of the limb; yet it was not by gangrene of the limb that this patient died.

It is not from my being limited to this fingle cafe, that I here prefs the point fo ftrongly; I do this only to make it clear, while I have many other cafes in

* My friend, Mr. Harknefs, cut off the thigh of a very big and ftrong man, on account of an aneurifm of the Femoral Artery complicated with a fracture of the thigh-bone; and although the blood had been interrupted only for three weeks, he needed to take up twelve great arteries with the needle, and ftill left the ftump bleeding at every point.

reſerve, which will perhaps prove the point as fairly. For example, when the celebrated Heiſter laid a large compreſs upon the wound of the Femoral Artery; and laid a ſucceſſion of firm compreſſes along all the courſe of the artery from the wounded part, quite up to the groin*; when he bound theſe compreſſes, by the tighteſt rollers, drawn with all his ſtrength; when he continued a compreſſion which ſuppreſſed the bleeding from a wounded Femoral Artery for three weeks; what did he do? Is it to be ſuppoſed, that theſe large compreſſes, merely ſuppreſſed the ſtronger action of the artery, and kept its wounded lips in contact, till they healed? Surely not; no one who has ever ſeen the lips of a wounded artery will expect ſuch a cure: for the lips of a wounded artery are ſo callous, and ſo turned away from each other, that the wound of an artery, ſtruck even with a keen lancet, reſembles (as the celebrated Monro, the father, obſerves, in deſcribing an aneuriſm of the arm), rather a round hole ſtruck with a punch. When Heiſter applied his compreſs and bandages ſo as to ſuppreſs the bleeding, ſurely he compreſſed the artery! When he compreſſed the artery, ſurely he put its ſides together! When he obliterated thus the canal of the artery, the force of the blood fell upon the inoſculating branches, and they would ſoon enlarge to ſuch a degree, as to carry freely all the circulating blood. The circulating blood would no longer ſeek the main trunk of the artery, which therefore

* This was Heiſter's contrivance for ſuppreſſing the bleeding in the caſe of the Shoemaker.

would contract by being empty; and its walls would adhere at that point where it was particularly compressed: Heister's cure by compression, would resemble, in all essential points, the cure by ligature; in this only it would differ, that besides being tedious, painful, uncertain, the cure by compression would obliterate both trunk and branch; for since the Profunda lies directly behind the Femoral Artery betwixt the compress and the bone, against which the artery is compressed, the compresses would obliterate the Profunda, as well as the Femoral Artery, leaving nothing to support the limb, but that series of inosculating arteries running along the back part of the thigh; the value of which I have just explained. In short, the Profunda lying so directly behind the Femoral Artery, as to be taken up by Gooch in the same ligature, may very reasonably be supposed to be affected by the same broad compress which covers the Femoral Artery.

But there is also another phenomenon in diseases of the Femoral Arteries, which is very interesting, and which proves this point completely; for independently of operations by ligature or compression, we have evidence in the natural cures, (as sometimes nature herself performs the cure,) that the Profunda may be cut off together with the Femoral Artery, and yet the limb be preserved. We see, for example, a great aneurismal tumor of the groin, we see it increasing rapidly till the skin threatens to fall into gangrene, and we are for some days waiting in great anxiety and fear, for that last change, in which the skin is to burst, and the patienr to expire with one sudden gush of blood.

Then the fever begins, the beating of the tumor ceases, the skin becomes livid, the whole limb is cold and without pulse, every thing seems to foretel an instant gangrene. But these which are so often the mortal signs of gangrene in the whole limb, are sometimes rather the presages of a happy cure; for either the clotted blood has so accumulated, or in the natural aneurism, (*viz.* that proceeding from a dilatation only of the artery), the looser coagula have so fallen down from the walls of the aneurismal bag into the main channel of the artery, as to stop the circulation from the groin downwards, in both the arteries of the thigh. Such obstructions turn aside the current of the circulation, new channels are found for the blood, and as it begins to flow more freely in these, the pulse, the heat, the feeling of the limb, are all gradually restored; they are perfect in a few days, the patient awakens from the low delirium which accompanied the first alarming signs, and not only his life is safe, but in a little while, his limb also is perfectly restored*.

Nay, a thing still more singular has happened, very nearly the same process has performed the cure; with this variety, that during this natural cure, the tumor bursting, has laid the limb so open, that the surgeon has (if we may be allowed the expression) been able to look into the limb, and see how the vessels were affected from the groin quite down to the ham. "A

* Cases of this nature, may be seen in the London Medical Journal, by Mr Joart Simmons, in the Medical and Surgical Transactions, and in other collections.

young man having an aneurism of about three weeks old in the groin, it grew in a short time to such a size, that after giving him excruciating pain, it burst inwardly, upon which the tumor flattened and extended downwards towards the hip; with relief of pain and increase of the œdema, which had for some time affected the leg. The leg now cold and motionless, was in danger of present gangrene; but in forty-eight hours, the limb seemed to recover, the œdema lessened, the tumor burst irregularly about the groin, and discharged its contents, partly a thin sanies, partly clotted blood. In eight days, the whole tumor, or in other words, the whole thigh, fell into such gangrenous suppuration, that it lay entirely open. The Sartorius, Pectinalis, Triceps, and all the muscles of the thigh were naked, and as if dissected. In the bottom of this great triangular hollow, lay the insertion of the Psoas Magnus also bare*. This gangrene of course penetrated quite to the Inner Trochanter of the thigh bone, and laid open all that part of the thigh, in which the nerves and great vessels lie. This triangular cavity, extended from the ligament of the thigh to that part of the triceps at which the vein and artery pass from the fore to the back part of the thigh, and in all that space, nothing was to be seen but the muscles clean separated, or dissected as it were,

* Hinc factum est, msculis, Pectineo, Iliaco, atque Psoas parte infera, sartorio, anteriori, denique tricipitis portione, denudatis, et a putredine vindicatis, triangularem alveum, postremis hisce geminis præcipue interclusum, ab inguinis ligamento ad sedem usque, qua decussatim implicantur, vasis, nervisque cruralibus in eodem alveo excurrentibus, a putredine penitus destructis, expoliatum rubentemque apparuisse.—GUATTANI.

by the gangrene. The great nerve, vein, and artery were entirely gone ; nay further, the ſurgeon, the celebrated Petro Javina, was obliged to puſh his finger up under the ligament of the thigh, and to make an inciſion there, that the matter from within the pelvis might come down more freely. It is not wonderful that the patient lying in this moſt miſerable condition died ſlowly, waſted by his diſeaſe.

There needs no experiment of injecting yellow water, to explain to us what had happened in this caſe. That the patient lived one month after the burſting of his aneuriſm, the thigh lying open all the while, is ſufficient proof that the limb was nouriſhed ; and ſuch a limb having lived, ſatisfies us alſo, that the thigh may ſurvive after the Femoral Artery is interrupted, after the Profunda alſo is cut off along with the Femoral Artery, and alſo after the common Iliac Artery is burſt abſolutely within the pelvis. But in juſtice to this intereſting ſubject, I muſt lay before you one caſe more, which I am induced to do for two reaſons ; in the firſt place, the caſe is perfect, the patient having lived ;—and, in the next place, I have but to preſent the caſe to you in a fair tranſlation, the chief accidents of it are already explained ; and if you reaſon for yourſelves as I have argued on the other caſes, you will find it clearly proved, that in the following caſes cured by the celebrated Guattani, not only the Profunda was compreſſed along with the Femoral Artery, but that the External Iliac was ſo compreſſed alſo at the paſſage from under Poupart's

ligament, that every artery on the fore part of the thigh, was ftopped.

"A goldfmith of the name of Morellus, fifty-five years of age, confulted Guattani about opening a tumor in the groin, which all the other furgeons declared had come to a perfect fuppuration. Morellus had, during the whole winter, complained of a fettled pain in the right groin, fometimes milder, fometimes very violent, but never abfent, accompanied during the winter only with a degree of lamenefs, but now in the fpring it had begun to fwell. When this unlucky Morellus, going along with others, on the 4th of June, to Saint Peter's, to fee the pompous ceremony of the confecration of the hoft, was feized fuddenly with fuch dreadful pain, that he was obliged to go home, and partly from fear, partly from the violence of the pain, went to bed and lay for three months under the care of his phyficians, their prefcriptions all ineffectual, his difeafe increafing daily; and the unfortunate Morellus now almoft hectic, was entirely confined to bed. There was great fwelling of the groin, contraction of the thigh, (fo that he could not ftretch it out), and a diftinct fluctuation of the groin, which extended from the Symphifis Pubis to the fpine of the Ilium, but ftill without tenfion or pain; but, on the contrary, the fluid fluctuated freely, and feemed to be immediately under the fkin.

Guattani could not allow himfelf to believe this to be a proper fuppuration, becaufe the fluctuation brought no relief; and though there was no pulfation, he yet fufpected aneurifm, and explaining himfelf on

this head to the conſulting phyſician and ſurgeon, Amicio and Maximinus, both profeſſors in Rome. They agreed to ſpend a few days longer in trying common remedies, partly that they might make a trial of ſuch remedies, but chiefly to allow time for Guattani to make up his mind concerning the nature of this diſeaſe.

After fifteen days, they found no change, except a new ſuppuration within four fingers breadth of the great trochanter, and, therefore, reſolved to do the operation, and to cut in the groin as the place the moſt favourable for ſtopping the flux of blood, in caſe of Guattani's fears about aneuriſm being well founded.

But leſt the aſſiſtants or friends, and more eſpecially the patient himſelf ſhould be alarmed with the ſight of blood, Guattani talked over this ſubject with the patient, aſſured him that he had provided every thing for ſtopping the blood, explaining to him at the ſame time, how eaſy it would be to enlarge his ſmall inciſion, in caſe of there being pus only in the tumor, and explaining alſo, that in caſe of pure blood flowing, he would preſently give it a free exit, ſo as at leaſt to empty the bag, and would let the freſh blood run ſtill, even after the emptying of the bag, if his ſtrength would bear it. After which, he pledged himſelf to ſecure the artery by compreſſion, if he could only get his compreſs fairly put down upon the artery itſelf. After all this, ſays Guattani, I truſt there will come on a good ſuppuration, and that you will be reſtored to perfect health; at all events this is

expreſsly what muſt be done, and all that can be done to attain that deſirable end."

"Morellus heard me," ſays Guattani, "with a compoſed mind, and we proceeded to our operation boldly; being provided with baſons for receiving the matter, and compreſſes and bandages for commanding the blood. Then the ſurgeon Maximinus introduced his curved biſtoury delicately into the higheſt point of the tumor, near the Criſta Ilii where the ſkin was particularly thin, when inſtantly pure blood guſhed violently out, to the great alarm of all preſent. But encouraging the patient, I took one of the baſons, ſays Guattani, in my own hand, and extracted ſuch quantities of blood by this ſmall opening that I filled one baſon, took up a ſecond, and ſtill continued my work, till the pure arterial blood began to flow, and the patient to faint." The blood was ſtopped by Maximinus clapping his thumb upon the orifice: and Guattani, by graduated compreſs one above another, with firm bandages, ſo ſuppreſſed the bleeding, that the patient did not faint, but, on the contrary, was preſently relieved from all his fever and pain; and being ſupported with cordials from time to time, he went on without either bleeding or any other bad ſymptom, and without their needing to touch the bandage till the 13th day, when the dreſſings being removed, nothing flowed from the wound but a little pus; which ſhowed that the artery was fairly cloſed, and encouraged them to go on with the cure. Although the ſuppuration was not exceſſive, they were forced to make a counter-opening, and accompliſhed

the cure in little more than two months.—Now the coagulated blood at firſt, and the freſh blood after, the patient's feeling no lowneſs during the emptying of the bag, and his fainting when the pure blood began to run, prove this to have been an aneuriſm, and Guattani did wiſely in allowing ſome of the arterial blood to eſcape, that he might have a greater command of the artery, and be enabled to compreſs it.

Now, it ſignifies nothing to the point, whether this was or was not an aneuriſm; nor, if it were truly an aneuriſm, does it ſignify whether it were an aneuriſm of a branch only, or of the main artery of the thigh; nor whether the aneuriſm were above or below that point at which the Profunda goes off. The queſtion is, Whether the main artery was ſtopped above the Profunda by the violent compreſſion which they needed to make? And this is ſolved by Guattani's reflections upon the caſe, which are theſe two only.

"This caſe ſettles, ſays Guattani, two great queſtions which diſturbed me very much; for in the firſt place, the preſſure was ſuch as to prevent the leaſt drop of blood from paſſing down the artery; whence I was ſatisfied that the limb was nouriſhed by the Internal Iliac Artery alone; and ſince this aneuriſm was cured by compreſſion merely, I am ſatisfied that compreſſion will cure any aneuriſm, whether from wounds or from diſeaſe."

The ſtrong concluſions of this caſe alſo the celebrated Murray tries to eſcape, by ſaying, "Vero ſimile videtur, Arteriam Femoralem ſupra inguen jam

divisam fuisse, nam alioquin, toto trunco compresso, vix ausa tam fortunate cessissent." But far from its being likely that the Femoral Artery divided above the groin, it is impossible for the Femoral Artery to have divided within the pelvis into two arteries destined for the thigh. The Iliac Artery does indeed divide within the pelvis into two arteries, but they are natural ones, *viz.* the Hypogastric Artery, going from within the pelvis to supply the hip; and the Femoral Artery, descending along the thigh.

Thus you perceive, that this question, whether to tie the Femoral Artery in the groin or to cut off the thigh, is a matter of serious importance; that there are everywhere proofs of its safety, if we will but seek them out; that there are every where doubts also about the safety of it in the books of the best authors, (for among the best authors the celebrated Murray must rank very high): But upon these proofs and reasonings I think my conclusion stands firm; that though our ligatures will not always hold; though it is never easy to command so large an artery as the Femoral Artery at the groin; though successive inflammations and the deep driving of blood will often hurt the inosculations, and prevent our success, yet some have been absolutely cured by tying the Femoral Artery at the groin, and the bodies of those who have died have proved how possible it was to have made a cure, and that in this, as in other aneurisms, the difficulty is not that nature, on her part, has failed to provide sufficient inosculations, but that the surgeon cannot, on his part, secure the great artery, so as to obliterate its canal and make its internal surfaces adhere.

The ſurgery of the other great arterial trunk, *viz.* the artery of the arm, ſtands preciſely in the ſame circumſtances, *i. e.* its inoſculations are perfect, and yet they are not known; for the rule of practice which directs us in wounds of the Femoral Artery to cut off the thigh, concludes commonly with a more violent declaration concerning the danger from wounds of the Axillary Artery: "But if the Brachial Artery be wounded near the Axilla, or if the Axillary Artery itſelf be wounded, it is neceſſary to take off the limb at the joint."

If a man will look only ſuperficially on theſe matters, or will be ſatisfied with a general concluſion deduced from the accidents only of one particular caſe, then indeed he will be hurried along into this raſh practice of cutting off arms as well as legs: Or in other words, if to eſtabliſh this rule of ſurgery, nothing more were required than an authentic caſe of a wounded Axillary Artery followed by gangrene and death, ſuch proofs might be found in every common book. Thus Mr. Gooch tells us, p. 76. "That he was called by a neighbouring ſurgeon to attend along with him a man who had been juſt before, in a ſtate of exceſſive intoxication, thrown from his cart, the wheels of which had paſſed over the top of his arm and ſhoulder, bruiſing all the parts quite up to his neck, while an iron hoop projecting from the cart had cut him under the arm, tearing fairly acroſs the artery and all the great nerves which go down along the arm."

"The limb was wholly deprived of ſenſation and motion, they felt no pulſe at the wriſt, and they conclud-

ed that the Brachial Artery was divided, although the bleeding, which was at firſt profuſe, had ſtopped, partly by the retraction of the artery, and partly by their having tied down his arm to his ſide."

" Had not the druken condition of the patient and the violent contuſion of the parts ſurrounding the joint diſcouraged us, ſays Gooch, we ſhould have propoſed immediate amputation at the joint. The next morning the arm appeared in different parts diſcoloured, emphyſematous and gangrenous; by noon it was totally dead and inſenſible to the finger ends; and on the third day towards the evening the patient expired. The day after his death, the arm was ſo thoroughly putrid that we were unable to diſſect it, till after having waſhed it well with warm vinegar and ſpirits, we opened it, and found the bundle of the great nerves entirely cut acroſs, and the artery alſo divided and its upper end retracted an inch into the Axilla."—But this, far from being a general proof, is an accident merely: It is explained by the general circumſtances of the caſe; the inebriation of the patient, his loſs of blood, the cutting of the whole bundle of the Axillary Nerves, are of themſelves ſufficient to account for his death. Perhaps he died as Captain M——did, whoſe caſe is related by the celebrated Mr. White, rather from his inebriation, loſs of blood, and wounded nerves, than from the neceſſary conſequences of his wound. Captain M——'s arm preſerved its circulation; the natural heat had returned; the vein ſwelled upon putting a ligature round the the arm, and he died after the arm was ſafe from all danger of gangrene.

But this case, related by Mr. Gooch, was complicated with other accidents; for we are told that they were deterred from amputation, by the bruised condition of the parts surrounding the joint. The wheel had passed along the arm and shoulder quite up to the neck; these parts were black; and I dare say, little better than gangrenous: It is no wonder then, that an arm so mangled, upon a body so hurt and disordered, fell into immediate gangrene.

Hence we see the folly of deducing any general conclusion from an individual case, and we are thus further reminded of this good rule in philosophy, that one positive evidence must outweigh any number of negative proofs. If we can find one single example of an Axillary Artery wounded, and the arm saved; it is then a settled point, that in favourable circumstances the inosculating arteries round the shoulder will save the arm; and the conclusion stands so firm, that though there should be produced against that single recovery a whole host of negative proofs, it evidently becomes our duty, whenever we are presented with such a case seeming to contradict this positive proof, to search into the circumstances and accidents which have made that one case fail, while another has been followed by such perfect success. As the purest case, the least complicated, and the most unequivocal example of this success, I put down the following:

"About sixty years ago, Mr. Hall was called to a man in Cheshire, who had received a very considerable wound, just below the Axilla, by a scythe which had divided the Brachial Artery. The man soon

fainted away with the lofs of blood, which preferved his life, as no body was near him. Mr. Hall, being only accidentally in the neighbourhood, had no needles with him; but as foon as he arrived, he eafily laid hold of the artery with his finger and thumb, till he could procure fome thread, which he immediately tied round the veffel, and effectually fecured it. The *man recovered the ufe of his arm*; though he had ever after a weak and trembling pulfe *."

It was the broadnefs and opennefs of this wound, that enabled the furgeon to fee the bleeding artery, and to take it up fo fairly, as to fave at once, both the life and the limb of the patient; for in many other cafes, it has only been by confenting to lofe the limb, that the patient has faved his life; or where the limb has been faved from amputation, it has in general hung lifelefs, and like a piece of mummy by his fide.

If it were worth while, I fhould be careful to explain the chief accidents of this kind, fo as to prove the following pofitions: That the wound of the Axillary is lefs dangerous ftill, than wounds of the Femoral Artery: That when gangrene has feemed to proceed from a wound of the Axillary Artery, it has been owing rather to the complications and accidents of the cafe: That when together with a wound of the artery, the bones are fractured, or the foft parts bruifed, as with a waggon wheel, the cure will be almoft impoffible, and the parts muft fall into gangrene: That where, by the force of the artery driving the

* Vid. White's cafe of Captain Mounfey.

blood inwards, the Cellular Subſtance and the interſtices of the muſcles are filled, or, as I may ſay, rather injected with blood, there we ſhall have a ſlow and tedious cure; that if the inoſculating arteries be torn by a lacerated wound, or their circulation diſordered and interrupted by a high inflammation and ſwelling of the parts, this alſo will make a very doubtful caſe, in theſe circumſtances alſo, it muſt be dangerous to attempt the cure. But all theſe do not belong to the general queſtion; they are merely the peculiarities of the caſe; they are the very points to be debated in any great conſulation; but they are not arguments for a general rule. Let, therefore, the ſurgeon do as he ſees prudent in caſes of wounded arteries, with lacerated wounds, broken bones, a diſordered ſyſtem, a weakly habit of body; but on account of a ſimple wound of the great artery, he ſhould not allow himſelf even to talk of the amputation of the limb.

Although I am ſatisfied that I have explained to you the true grounds of this rule of practice, yet I ſhould feel as if there were ſomething imperfect in the proof, unleſs I ſaid alſo here, as I did in ſpeaking of the lower extremity, a few words about the inoſculating arteries. The arteries which go round the joint of the ſhoulder, may be very properly compared with thoſe which belong to the hip joint; the one ſet of arteries goes round the Scapula, as the other goes round the haunch bone, and the one is as well able as the other, by free inoſculations, to ſupply the limb below. Firſt one great artery comes from within the

cheſt, paſſes tranſverſely acroſs the root of the neck, croſſes over the ſhoulder, and going down over the Scapula, ſhould be named the SUPRA-SCAPULAR Artery, and is one upon which we may chiefly rely *. Secondly, Other great branches come off from the artery without the cheſt, from the deepeſt part of the Axillary Artery, where it lies high up in the axilla. Theſe as they turn over the lower part of the Scapula, ſhould be named the SUBSCAPULAR Arteries, and they have free inoſculations with thoſe above. The third great artery coming off from the general trunk of the humeral artery, is a great muſcular branch, which runs down along all the back part of the arm; belongs chiefly to the muſcles and (like the muſcular artery of the thigh), this alſo is named PROFUNDA. And whether the great artery be wounded juſt where it comes from under the clavicle, *i. e.* betwixt that great branch which goes over the Scapula and that which goes round the Scapula from below; or whether it be wounded betwixt the lower Scapular Artery and the *Profunda*, ſtill the limb is ſafe; we are aſſured of it by caſes; we foreſee the ſucceſs of all ſuch

* This artery is regular, as far as relates to the Scapula, but in its origin it it quite irregular. This great artery, going over the Scapula, named Supra-Scapular artery or Arteria Dorſalis Scapulæ, moſt commonly comes from within the cheſt, being the firſt great branch of the THYROID ARTERY; ſometimes it proceeds from the CERVICALIS, or artery of the neck; ſometimes it comes off upon the outſide of the cheſt; it makes large inoſculations, and is the branch particularly to be depended upon; but all the Cervical Arteries aſſiſt with their leſſer inoſculations, and all of them, or any one of them, may be ſo enlarged as to perform this office.

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operations by the ſucceſs of our injections; I have often found that when even in the oldeſt ſubjects, I have puſhed injection (of the coarſeſt kind), from the arch of the aorta, trying to ſave the arteries of the arm for a ſecond injection, by tying both arteries in the axilla very ſecurely, I have notwithſtanding, had an injection of the arteries of the arm; ſometimes in both arms, more frequently only in one; but even one experiment of the kind, and one arm injected, were a ſufficient proof.

And you will be inclined to remark this proof as a very ſtrong one, when I inform you that our coarſeſt injection goes thus freely round the inoſculations of the ſhoulder, (where we are ſo much afraid of performing an operation), while even tepid water will not paſs, or will ſcarcely paſs round the inoſculations of the elbow, where in our operations for the common aneuriſm, we are ſo ſure of ſucceſs.

As for the inoſculations in all the lower parts of the arm, no doubts about their ſufficiency trouble us now, although this alſo is a degree of confidence and boldneſs in ſurgery which we have attained very ſlowly.

I have already mentioned, that whenever a ſurgeon ventured to perform the operation for aneuriſm at the bend of the arm, he was careful to have his amputation inſtruments ready, and we find the celebrated Ruiſh ſpeaking of this operation in ſuch terms: "This is an operation which ſurgeons choſe rather to deſcribe, than to perform, I have good reaſon to ſay ſo, ſince, for more than 20 years, in all this great city to which ſo many under all kinds of ailments crowd for

aſſiſtance, no ſurgeon, as far as I have heard, has ventured to tie ſo great an artery *."

Heiſter believed, that wherever we cured the aneuriſm of the arm by tying the artery, the arm was ſaved, by a high forking of the artery, and it was only latterly he began to ſuſpect that the ſmaller branches might ſometimes be ſo far enlarged as to carry the blood freely; becauſe he occaſionally obſerved, that after the operation for aneuriſm there was no pulſe in the wriſt during three days, after which it began to be perceived, and ſoon returned to its natural ſtrength †.

" If the Axillary Artery be wounded, ſays Mr. Gooch, it is neceſſary to take the limb off at the joint; yet as there are inſtances of the Brachial Artery dividing into two, ſoon after it leaves the axilla, which luſus naturæ I have obſerved at different diſtances in the arm, it will be rational practice when we feel a

* It is commonly ſaid, that Ruiſh was actually the firſt who had performed this operation in Holland; whereas, the paſſage ſtands thus: " Operationem ſane ab authoribus majus commendatam et " laudatam quam inſtitutam; quod dicere non gravor, quia viginti " abhinc annis, et quod excurrit in hac vaſta civitate, ad quam ſine " numero confluunt afflicti, hanc operationem in arteria adeo ingenti " nullus (quantum noverim) chirurgorum inſtituit," Ruiſh, Vol. I. Obſerv. 2.

† " Poſſe vero ramulos minores ſe ita ſenſim dilatare, ut §. XXXVIII. " diximus, Clar. Du. Præſes inde ſuſpicatur, quia cum aliquando trun- " cum arteriæ brachialis internum, graviter vulneratum, prædicta ra- " tione ſupra vulnus ope fili circumdicti ligaſſet, intra triduum nul- " lum in arteria juxta carpum poſita, quæ a medicis explorari ſolet, " pulſum ſentire aut percipere potuit; poſthæc vero hanc arteriam, " primo leviſſime micare, ſenſim vero ſenſimque penitus pulſare " ſenſit."

pulsation at the wrist: to treat such case as an aneurism, by tying the artery," &c. p. 72.

In short, there were two accidents with which the older surgeons encouraged one another to this operation, *viz.* that the artery often forked very high in the Axilla; or secondly, that in common an artery touched with the lancet in bleeding, was pricked not in its trunk, but only in one of the two branches into which it divides at the elbow. Thus Chesselden says, "I had always thought this wound was in the Inferior Cubital (*i. e.* in the Ulnar) Artery, and thus the sudden reflux of the blood was accounted for, by the communication of the two Cubital Arteries in the palm of the hand, and thus satisfied, I inquired no further; though Mr. Sharp, even so long ago as when he was my apprentice, told me that the wound was in the trunk, in the Humeral Artery itself, as indeed it is," p. 457. And yet the celebrated Dr. William Hunter, notwithstanding this affirmation of Chesselden, lays it down in the most formal positive manner, in the shape of a practical rule or inference, we know not what to call it, marked xv. "That though the Brachial Artery in most people divides into its two branches a little below the part where we commonly bleed; yet perhaps it will be found, that the aneurism happens oftener to one of the branches, than to the trunk of that artery, because these often lie nearer the skin, and are thereby more exposed to injury," p. 353.

This has nothing in it of the usual correctness of Dr. Hunter, for in point of fact it is wrong; the branches do not lie nearer to the skin, they are buried deep un-

der the bellies of the pronators and flexors of the arm, and any one may know this, whoever in his life has tied up an arm for bleeding, where he muſt have obſerved the ſtrong beating of the artery only where it was entire, running in one trunk under the Median Baſilic Vein. And his reaſoning is farther wrong than his aſſertion; for if in moſt people the artery divides a little below the place where we bleed, it matters little whether below that point the two branches be ſuperficial or deep, the aneuriſm cannot happen "oftener to one of the branches than to the trunk."

I feel myſelf entitled to ſet up at the concluſion of this diſcourſe, a rule, the very reverſe of that with which it began, and to ſay, that after theſe proofs, the queſtions about inoſculations may be blotted out altogether; that wounds of the Axillary Artery, like wounds of the Femoral Artery, are often dangerous from bleeding, but never fatal from the want of inoſculations; that we ſhould tie the greateſt arteries confidently wherever they are wounded without the trunk of the body, and that we ſhould tie the arteries as boldly at the groin or in the axilla as in the leſſer branches going down the thigh or arm. Accidents undoubtedly (as we are in all our operations at the mercy of accident) may prevent our atchieving a cure; a limb bruiſed with a waggon wheel, or wounded with a great ball, cannot be ſo eaſily ſaved, as when the artery alone is wounded by the ſtab of a knife or ſword: Yet although the accidents and dangers of gangrene were multiplied tenfold, this common way of cutting off the thigh, or amputating the arm at the ſhoulder joint, is bad doctrine, and cruel practice.

THE TANJORE MAHARAJA SERFOGI'S SARASWATI MAHAL. *

DISCOURSE III.

OF THE CONDITION OF A WOUNDED ARTERY;

OF THE NATURE OF THE TUMOR WHICH RISES OVER THE WOUND OF A GREAT ARTERY; AND OF THE WAY OF OPERATING IN THOSE RECENT ANEURISMS.

I AM now to explain to you the condition of a wounded artery; not where it is touched in a wide and open wound, for there the artery bleeds profuſely, and either it is preſently tied, or the patient dies. But I am to explain to you the ſtate of a greater artery, wounded deep among the muſcular fleſh, ſtruck perhaps with the point of a ſword or knife, or cut acroſs by a ball, for then the blood eſcapes difficultly through the narrow wound; there is little outward bleeding; the artery bleeds chiefly within, and by that inward bleeding forms a ſudden tumor of the moſt dangerous kind, requiring a ſudden operation almoſt as if the artery were ſtill open pouring out its blood: The artery, indeed, is ſtill open, is ſtill pouring out its blood, and nothing reſiſts it but the ſkin; if that ſlender barrier give way, the patient dies with one guſh of blood.

When a man is wounded in any great artery, the blood flows in ſo full a ſtream, that in a moment he faints, falls down, and it is then only that the by-ſtanders can command the blood, by gathering up any cloths that are at hand, and cramming them into the wound in a confuſed and ineffectual way, till at laſt the ſurgeon comes and ſtops the blood. Now the ſurgeon at the firſt ſight of ſuch a wound is himſelf alarmed, he fears that it is the great artery of the limb; he is unwilling to cut up the arm or thigh, and to undertake the tying up of the great artery without ſome farther help and advice; he throws off the looſe cloths or bandages; lays a fair and very firm compreſs upon the wound; rolls it with a ſteady bandage, and leaving a tourniquet about the limb, informs the friends of all his fears, and of all the expected difficulties and dangers of ſuch a caſe, and deſires that ſome conſulting ſurgeons may be called. The conſultation proceeds at firſt upon theſe points, the place of the limb that is wounded, the ſhape of the weapon, the deepneſs of the wound; but the ſurgeons do not in general unbind the wound, at leaſt if it be a deep and punctured wound, till the ſkin has adhered, till the aneuriſmal tumor is formed, and then being able to undo the dreſſings without any danger of farther bleeding, they have all the caſe before them.

The tumor riſes higher and higher every day; at every viſit they ſee a change. The tumor is large, hard, circumſcribed, and beating very ſtrongly; the ſkin over it begins to inflame, the wound of the knife threat-ens to open again, the whole limb is feeble and cold;

the ſurface of the tumor is livid, and in a few days the beating from ſuch an artery, as the Femoral Artery, is moſt alarming, and to the patient very awful; he ſpreads his hand broad over the tumor, feels its beating, like the heart in its ſtrongeſt palpitations; beating againſt the ſide. He is laid with tourniquets round the limb; he ſees by theſe precautions, and he feels, as it were, that if the tumor burſt during the night, he muſt loſe his life with one guſh of blood. Lying in this anxious condition, he is watched from hour to hour, till the time appointed for the operation arrives; and it is then only, (however great the ſurgeon's fears about this operation), that the patient is in any degree ſafe.

It is not always that the ſurgeon has his mind ſo ſettled concerning the tying of theſe great arteries, as to do his operation on the very moment of the wound; and yet he may as well do ſo; for whether he determine by his reaſoning that it is ſafe, or dangerous, to tie the great artery of the limb, ſtill the circumſtances of the wound are the ſame; and the artery, whether it be the great artery, or ſome ſecondary branch, whether punctured or fairly cut acroſs, is loſt to that limb; and ſince the wound itſelf of a great artery cannot heal, its cavity muſt be cloſed. This alone ſhould determine us how to move in this critical moment; and I am clear, that the ſurgeon when he is called in good time to ſuch a wound, ſhould clap the point of his finger upon the wounded artery, or make his aſſiſtant hold the artery; cut the wound ſo far open, as to ſee the artery fairly; draw it out if it be cut acroſs, and have ſhrunk among the fleſh; or tie it like the artery of the

arm in aneurifm, by paffing ligatures under it, if this greater artery be punctured only with the knife or fword, as that of the arm often is with the lancet.

But in nine of ten cafes, the furgeon wants courage to do this, as he thinks, hopelefs operation, upon the fpot. The cafe falls to be determined by flow and hefitating confultations, the furgeons debate whether it be the trunk of the artery that is wounded; whether if it be the trunk, it fhould be tied; doubting perhaps, whether the limb fhould not rather be cut off. Thus the outward wound is allowed to heal, the inward bleeding goes on, and the regular aneurifmal bag is formed. There are certain circumftances, in which it is even our duty to bring the cafe into this fhape; for example, if there be a wound of the great arteries in the back of the hip, in the groin, in the armpit, we cannot command the blood eafily; we are not fure of clapping our finger down upon the artery, at the very point where it is wounded; we are afraid left the patient fhould die, (even after we have come to him), with one fingle gufh of blood; we therefore clofe the narrow wound, put its lips together, fettle it with a very fteady comprefs and bandage, and try to make the lips adhere, and then we have a fair aneurifm, which we can look upon compofedly; we can reflect upon the courfe of the wound, and calculate which artery is moft probably wounded; for befides the main trunk there are other arteries in the armpit and the thigh, as the arteries of the fcapula or the Arteria Profunda, which being wounded, will make aneurifms as large, though not fo dangerous as thofe of the Axillary or Femoral Arteries,

and to be diftinguifhed from them chiefly by the pulfations in the wrift or ancle, continuing ftrong *.

The arterial trunks and all their greater branches in every part of the body lie under the fafcia; and feem to owe no lefs to the fupport of thefe fafciæ, than the mufcles themfelves. Over all the body the fafcia is almoft equally ftrong; the fkin and fafcia, where the wound is fecured with compreffes, are preffed together and adhere; the blood, by this accident, is always driven hard under the fafcia, and is never diffufed under the fkin; the fkin merely covers the aneurifmal tumor, while it is the tenfe fafcia that gives form to the aneurifm. The fafcia, thus confining the blood, limits the fize of the tumor, gives it a fair and circular form, is itfelf tenfe and firm, livid alfo by the colour of the contained blood; fhining and refplendent like the inner furface of the gizzard of a fowl, and the fkin and fafcia may be cut diftinctly from each other, as freely as we cut the fkin over a difeafed breaft without touching the hardened gland, or rather, (for a more clofe refemblance), as we draw our knife clean along the furface of a hernia, without touching the fac; or as we cut the fcrotum over the hydrocele without touching the vaginal coat.

Nor is the furface of an aneurifmal bag very irregular, even upon its back part, for each mufcle is involved in its own fafcia, fo that the fafcia is alfo of tolerable

* The pulfation may fometimes continue in the lower part of a limb, notwithftanding a wound of its main trunk, from the obliquity of the outward wound, as fhall be explained prefently.

ſtrength within; the internal proceſſes of the faſcia, and the condenſation of the cellular ſubſtance, (as it is driven cloſer by the blood), ſet alſo ſome bounds to its extenſion within, ſo that the blood is no more diffuſed among the fleſh, than under the ſkin; but the circumſtances of the tumor will vary infinitely according to the nature of the wound. I have ſeen the Femoral Artery cut fairly acroſs with the knife; there the wound, paſſing deeper than the artery, will allow of a greater bag, and the artery will pour out its blood behind, as well as before it. I have ſeen the Femoral Artery juſt touched with the point of a penknife and not transfixed, the wound not paſſing through the artery, no blood behind, but the aneuriſmal bag formed immediately beneath the faſcia and ſkin, and the artery keeping its place among the muſcles of the thigh; nothing of the artery but the wounded ſlit in it appearing, the muſcles adhering firmly to the artery, and with a degree of inflammation, and thickening; the flat ſurface of the artery nitched in among the inflamed muſcles, and the flat ſurfaces of the muſcles themſelves forming the back part of the tumor: and I have alſo ſeen the artery entirely cut acroſs by the fractured ends of the thigh bone, ſo that the oppoſite ends of the artery hung together by a ſingle tag, and the aneuriſmal bag, inſtead of being formed betwixt the faſcia and the great muſcles of the thigh, was formed betwixt the great muſcles and the bone, ſo that the broad belly of the muſcle named Vaſtus Internus, formed the chief ſurface of the ſac. But whatever be the form of the bag or the condition of the artery, let the ſurgeon be prepar-

ed to encounter difficulties, by trying to calculate how the parts may probably be connected with each other, whether under the fasciæ only, or under the muscles, whether pressed together by inflammation, or thickened by the driving and compression of the blood.

Thus the advantages from an aneurismal bag being formed before we are called, or by our own compresses healing the wound, are these; that we are not hurried all at once into the midst of a bloody operation; that we are somewhat easy about our patient's immediate safety, there being no danger of fatal bleeding, at least for a few days; that we have warning of every dangerous change by the alteration in the surface; that we have time to consult; to calculate which artery is wounded, and to settle all the steps as in any other operation, putting our tourniquets round the leg or thigh, or settling the compresses of the calvicle or groin, if the artery be wounded very high.

But it is equally plain, that though a recent aneurism is thus managed with more ease to the surgeon, and less loss of blood to the patient, than a large and open wound; yet an old aneurism, suffered to grow for weeks or months, is attended with great danger; for if the artery be very great, as in the hip or thigh, the bag enlarges very rapidly; all the parts are compressed and hurt, the blood is driven deeper and deeper among the muscular flesh, and at the same time that the soft parts are disordered, even the bone may be spoiled, which must render the operation ineffectual in saving the limb. The accumulation makes it more difficult to find the artery, presses it deeper

every moment, and farther out of the reach of the ſurgeon; the bag comes, in a few weeks, to hold ſix or ſeven pounds of blood, and this extenſion of ſurface, cauſes a greater ſuppuration, which (wherever the matter is, as in this caſe, contaminated with blood), is never kindly nor well diſpoſed to heal.

Wherever we have it in our power to apply the tourniquet, and command the blood; or in other terms, wherever we have to deal only with a wound, or ſmaller aneuriſm of the arm or ham, or the lower part of the thigh, the operation is eaſy. But in the greater aneuriſms of the armpit, haunch or groin, we muſt truſt nothing to compreſſion, and muſt do our operation with particular boldneſs and ſkill, otherwiſe we ſhall hardly ſave our patient, for in a very moment he his either ſaved or dead.

The rules belonging to this caſe of an aneuriſmal bag, holding ſome great artery, are chiefly theſe:

1. You are not to truſt entirely to the compreſſion which your aſſiſtant tries to make upon the groin, or below the clavicle; for it is one matter to ſuppreſs the pulſe in the lower part of a limb, and another to ſtop altogether the current of the blood; but you are to look upon this as an open artery, and expect that the moment you cut the tumor, the blood will ruſh upon you with a terrifying violence: nor ſhould you ever expect to clean the great cavity with ſponges or cloths, for the artery will fill the cavity with blood, faſter than you can throw it out, till the patient breathes his laſt. Inſtead of this, you draw your knife deliberately and fairly over the tumor, ſo as to lay it open. The ſkin

being thus divided, the great livid bag of the aneurism, surrounded with its strong fascia, rises into view. Next push your lancet into the bag, and then do all that remains in your operation with great boldness; run your bistoury upwards and downwards so as to slit up the tumor quickly; plunge your hand suddenly down towards the bottom; turn out the great clots of blood with your hand and fingers, till having reached the bottom entirely, you begin to feel the warm jet of blood, and directed by that, clap your finger upon the wounded point of the artery, as it has but a point, your finger will cover it fairly, and your feeling the beating of the artery, assures you that all is now safe.

Now the bleeding, confusion, and fainting are over in a moment; the operator breathes, and the assistants are composed; and all the operation goes on easily and safely. The artery is effectually commanded by this pressure with the finger; but the first movement in such an operation, *viz.* the act of stopping the blood is all boldness, and nothing of caution; no danger is to be apprehended, but that of suffering your patient to lose blood.

2. Being now composed, you take time to arrange every thing for the next step of your operation, you feel the beating of the artery with the point of your finger, perhaps you lift the point of your finger for a moment, to discover whether the pressure of your assistants, at the groin or clavicle, commands the artery: If so, you lift your finger, and examine round the artery; if not, you keep your finger steady, make the assistants clean the bag round the artery; then, if

the artery lies fair and free in the bottom of the cavity, you proceed to tie it; but if not, you muſt diſſect round the artery, until you ſet it free from other parts, and have it ſo inſulated as that you may put your ligature eaſily under it; unleſs indeed the recollection of ſome great trunk being near the wounded artery (as of the Profunda, when you are tying the femoral artery) ſhould ſtop you; but yet the nearneſs of any great artery or nerve, is an argument as ſtrong againſt your diving with the needle to catch the wounded artery, as againſt your diſſecting with the knife. Since therefore the diſſection is done with your eyes open, and you can ſee and feel before the point of your knife; rather diſſect, or ſometimes tear the artery naked with the point of your fingers, tying its open mouth, if cut acroſs, as fairly as in an amputated ſtump; or if it be touched only with the point of a knife or ſword, put two ligatures round it, one above and one below the wound, and put them neatly and fairly round the artery, as in tying for aneuriſm of the arm, and cut it acroſs betwixt the two ligatures.

3. In regard to the ſize and form of your ligatures, do not allow in yourſelf the ſlaviſh and abſurd fear of cutting arteries acroſs with them. It makes ſurgeons uſe ligatures in amputation, ſuch as are often ineffectual; and in aneuriſms of the thigh or ſhoulder, they uſe ſuch tapes as it would be impoſſible to draw tight even round the aorta, though that could become the ſubject of their operation; the circle of the knot made by ſuch a ligature is often wider than the diameter of the arterial trunk. Surgeons have complained that

they could not draw their tapes tight enough round the femoral artery, even with the whole ſtrength of their hands.

Let your ligature, then, be made of three or four threads well waxed, tied not with the ſurgeon's knot, but with one ſingle knot moderately drawn, ſecured with a ſecond ſingle knot, the threads left hanging from one corner of the wound.

4. It can hardly be neceſſary to adviſe, that after ſuch operations upon the Humeral or Femoral artery, tourniquets be ſtill kept round the limb, to guard againſt thoſe accidents, which have ſo often happened, and will we fear continue to happen, in the hands of the moſt famous ſurgeon.

But if it chance that the parts are ſo maſſed with inflammation, ſo diſordered by the driving of the blood in old aneuriſms; or perhaps the parts ſo hurt, as to be almoſt in a ſtate of gangrene; if the ſurgeon cannot by any means get a fair view of the artery, and that his patient be loſing blood, pouring from ſome great trunk, then muſt he ſtrike his needle at random, in order to come at his object the neareſt way; and the only ſatisfaction that he can have, or the only proof of his having tied the artery at all, will be only the ſudden ſtopping of the blood, when he draws his ligature. In circumſtances like theſe, the greateſt ſurgeons, (even Mr. Pott himſelf), have been accuſed of having miſſed the artery; but at all events ſince it is irregularly tied, or perhaps not at all, the attendants that are appointed, muſt be ſkilful, and muſt be intereſted; both friends and ſurgeons ſhould watch

over the patient's life moſt faithfully; for ſucceſſive bleedings will happen, often from ſome ſudden turn, or unwary motion in his bed during the night; and he is loſt or ſaved in a moment of time *.

One thing I am chiefly afraid of, that this deſcription may ſeem overcharged; that I may appear to have exaggerated the difficulties of an operation like this; that it may be thought that an accident requiring all theſe precautions, and this plunging down of the hand, can hardly occur. Therefore I ſtate to you the following caſe, and I dare ſay, after having conſidered it, you will perceive that it needs no apology; but that as it is new and intereſting, it deſerves its place.

A poor man, who was by trade a leech-catcher, fell as he was ſtepping out of a boat, and the long and

* Mr Hume ſays, in reporting one of Mr. Pott's obſervations, that the depth of the inciſion made it very difficult for any one but the operator, and thoſe immediately around him, to ſee what was included in the ligature; and at the time the Popliteal Artery was *ſuppoſed* to be ſecured by it. The inſinuation is as direct, as good manners will allow; but it is more than an inſinuation; for in an account of the ſame caſe, publiſhed ſome years ſince, Mr. Hume ſays, " No doubt was made at the time, of its being any thing but the artery that he had tied." Next, Mr. Hume proceeds to reaſon upon it in ſuch a form, as to imply a direct affirmation, that the artery was not tied. Whether the aneuriſm was in a branch, or whether it was in the trunk of the artery, the pulſation ſhould not have been felt in the tumor, if the Popliteal Artery was rendered impervious: But however we ſhall chooſe to explain it, the fact is, that by the ſecond day after the operation, the artery was again throwing its blood into the aneuriſmal bag, ſo that a ſtrong pulſation was felt; and the tumor ſwelled ſo rapidly, that Mr. Pott cut off the limb.

pointed ſciſſars which are uſed in his buſineſs being in his pocket, pierced his hip exactly over the place of the ſciatic notch, where the great Iliac Artery comes out from the pelvis. The artery was ſtruck with the point of the ſciſſars, it bled furiouſly, the patient fainted; and in ſo narrow and deep a wound, the ſurgeon, when he came, found little difficulty in ſtopping it up, and leſs difficulty ſtill in making it heal. The outward wound was cured; the great tumor ſoon formed; and the man travelled up from the North Country, where the accident had befallen him, and in ſix weeks after arrived in our hoſpital here with a prodigious tumor of the hip, his thigh rigidly contracted, the ham bended, the whole leg ſhrunk, cold, and uſeleſs, as if it had been an aneuriſm rather of the artery on the fore part of the thigh.

The tumor was of a prodigious ſize, and by that very circumſtance of its being one of the greateſt aneuriſms, it loſt all the characteriſtics of aneuriſm, eſpecially there was no pulſation, no retroceſſion of the blood when the tumor was preſſed upon; there was nothing peculiar except this, that the great and ſudden diſtenſion was the cauſe of great pain; and from the continual pain, lameneſs, and his hopes of a cure, he was ready to ſubmit to any thing, beſeeching us to operate.

There was little doubt of its being a great aneuriſm, but there was a poſſibility of its being a vaſt abſceſs; and it was reſolved, in conſultation, that he ſhould be carried into the operation room; that a ſmall inciſion ſhould be made; that the ſkin being

cut, the bag itſelf ſhould be juſt touched with the point of a lancet; and if found to contain matter, ſhould be fully opened; but if blood, that it was then to be conſidered as an aneuriſm of ſo particular a kind, as to entitle us to call for a full conſultation.

I made an inciſion two inches and a half in length; the great faſcia in the hip, blue, and very ſtrong, formed the coat of the tumor, and under that were ſeen the big fibres of the great Glutæus Muſcle. The knife was ſtruck into it, and large clots of very firm black blood rolled out by the tenſeneſs of the tumor, which began to emit the clots in this way, the moment that it was opened at one point. There was one thing further deſirable before we put the patient to bed, that we ſhould underſtand the caſe ſo far as to be able to report to the conſultation, whether the artery was abſolutely open, and whether it was the great artery of the hip. I continued therefore (knowing that the opening I had made could be covered with the point of the thumb) to pull out a few more clots of blood, till the warm and florid blood began to flow; I then puſhed in a tent-like compreſs into the ſmall wound of the tumor, (*viz.* of the faſcia), laid a broad compreſs over the outward wound, and put the patient to bed with one of the pupils holding his hand upon the hip.

This was done at one o'clock, and at four the conſultation met, and the operation was performed. And in my notes, I find two ſteps of the operation chiefly marked: Firſt, That upon our opening the tumor fully with an inciſion of eight inches long, and turn-

ing out the great clots, the blood was thrown out with a whiſhing noiſe, and with ſuch impetus, that the aſſiſtants were covered with it, and in a moment twenty hands were about the tumor, and the bag was filled with ſponges, and cloths of all kinds, which had no better effect than the cloths, which, in any accident, the friends in great confuſion wrap round a wounded arm; for though the blood was not thrown in a full ſtream, nor in jets, it was ſeen riſing above the edges of the inciſion; it floated by the ſides of the cloths, which were preſſed down by the hands of the aſſiſtants. But we knew by a more alarming ſign that the artery was throwing out blood; for the man who was at firſt lying not flat, but ſupporting himſelf on his elbows, fell down, his arms fell lifeleſs, and without pulſe, over the ſide of the table, his head hung down and was livid, he uttered two or three heavy groans, and we believed him dead.

Secondly, Seeing in this critical moment that if he was to be ſaved, it could be only by a ſudden ſtroke, I ran the biſtoury upwards and downwards, and at once made my inciſion two feet in length: I thruſt my hand down to the bottom of the tumor, turned out the great ſponge which was over the artery, felt the warm jet of blood, and placed the point of my finger upon the mouth of the artery; then I felt diſtinctly its pulſe, and then only was I aſſured that the man was ſtill alive. The aſſiſtants laid aſide the edges of this prodigious bag, and ſought out the ſeveral ſmaller ſponges which had been thruſt in, and the bag being deliberately cleaned, and its edges held aſide, I kept the fore

finger of my left hand ſteady upon the artery, paſſed one of the largeſt needles round under my fore finger, ſo as to ſurround the artery: one of my friends tied the ligature, and then upon lifting the point of my finger, it was diſtinctly ſeen, that it was the Poſterior Iliac Artery,—that the artery had been cut fairly acroſs, and had bled with open mouth—that it was cut and tied exactly where it turns over the bone: and although the extremities were cold, the face of a leaden colour, and the man had ceaſed to groan, and lay as dead; though the faint pulſation could not be felt through the ſkin, in any part of the body; we ſaw the artery beating ſo ſtrongly, whenever I lifted my finger, that we were aſſured of our patient's ſafety; however, he was ſo low that after laying down the ſides of the ſac, and putting bandages round his body to keep all firm, we were obliged to have a bed brought in, and having given him ſome cordials, we left him to ſleep in the great operation room, attended by the pupils and by nurſes.

He was cured of this great wound in leſs than ſeven months, although his cure was protracted by the foul ſuppuration of ſuch a bag, and by the exfoliation of the Ilium and Sacrum, which ſpoiled, not ſo much from their having been laid bare by the laſt ſudden ſtroke of the knife, as by the aneuriſmal blood having lain upon them; the exfoliations were very large, and the Sacrum eſpecially continued exfoliating to the very day on which the wound cloſed.

I do not know whether this man be recovered entirely, for he left the houſe lame, from the contrac-

tions of the hip and ham, and walking by the help of a ſtick; but however, he thought himſelf fit to undertake his profeſſion, and went to England with that deſign *.

This caſe will impreſs the directions already given upon your mind, and is ſingular and well worthy of a place, ſince this was one of the largeſt aneuriſms ever heard of, containing not leſs than eight pounds of blood. It is an inſtance of one of the leaſt probable of all wounds, *viz.* a ſmall ſharp point touching one of the deepeſt arteries, and one of the largeſt; and wounding it at the very point, where it comes out from the trunk of the body; and where it cannot be compreſſed; for though my friend Doctor Farquharſon, tried to make ſome impreſſion upon the deſcending aorta, by preſſing down his fiſt into the belly, ſo as almoſt to touch the ſpine, ſtill there was a deluge of blood upon cutting up the tumor, and the artery beat ſtrongly under my finger.

But there is a thing more diſtreſſing to the ſurgeon, than all the difficulties of the operation, viz. That the artery after it ſeems to be ſecured, often gives way; ſo that as I have obſerved already, ſuch caſes are dangerous, not ſo much by nature failing in her buſineſs of ſupporting the circulation through the anaſtomo-

* Dr Farquharſon, who ſucceeded me in the charge of the Hoſpital has juſt informed me, of this man having called upon him after his return from England, walking ſtoutly, and in good health.

ſing arteries, as by the ſurgeon's not being able on his part to ſecure the greater arterial trunks; hardly any have died of gangrene; very many have died from the loſs of blood: It was from frequent diſappointments that Mr. Hunter was induced to change his operation; he tied the Popliteal Aneuriſm, not in the ham, but in the thigh, thinking to find the artery leſs diſeaſed at that higher point. It was under the ſmart of frequent diſappointments, that he thought of this new operation, and I fear, his diſappointments were not fewer after this change; for in glancing our eye over the liſt of caſes, we find, that it is by hæmorrhagy that patients have generally died, ſome after the common operation, ſome after the operation in Hunter's way, ſome have died early, ſome late, ſome even have died of bleeding, ſo late as the twentieth day.

In one of Mr. Hunter's operations, the artery gave way, even ſo late as the 26th day; for this fatal bleeding began firſt upon the 14th day; returned, and was ſuppreſſed by compreſſes upon the 19th day; burſt out upon the 20th day; and burſting out upon the 20th day a ſecond time, Mr. Hunter was forced to cut up the thigh on its fore part, and tie the artery anew: But ſtill the artery was not ſecured, on the 23d day it was ſtill bleeding, and on the 26th day it bled violently, till the man fell low, fainted, became delirious, and expired.

Mr. Birche's patient died on the 14th day; he went in the evening to ſee him, but he had juſt expired, "The limb was ſtill warm, he lifted the dreſſings, and he found a ſmall ſtream of freſh arterial blood iſſuing

from the wound:" Heifter, and Hunter, and Pott, and the celebrated Sabbatier, and Mr. Dufchamps, and Mr. Deffault, all of them have loft patients by the burfting of the artery, and after death injections thrown into the Iliac Artery, have run freely out by the wound in the thigh. ' All thefe patients have died of bleeding, and all of them have lived long enough to prove that the limb was fafe.—From thefe accidents, we are now certain, that there is either fomething peculiar in the nature of a great artery, fo that it cannot eafily be fubdued; or that there is fomething wrong in our manner of operating, or that the confufion of thefe operations is fuch, that even the beft furgeons are accufed of having failed: Mr. Pott himfelf, was only *fuppofed* to have tied the artery of the thigh. Such accidents happening thus in the hands of the moft famous furgeons, fhould be remembered in vindication of thofe to whom in future the like misfortunes may happen: Should they not alfo be a ftrong motive for our ftriving to find out by future obfervations what may be the caufe?

We are not yet arrived at fuch a degree of knowledge, of the ftructure, and functions of arteries, as to underftand fully the caufe of this infecurity; but we cannot be without a defire to underftand it. I fhould put down here fome notions on this fubject more freely, if I thought them in any degree proved; but, however, the few that I fhall now propofe, leads us to precautions, which have this advantage at leaft, that they do no ill.

The moft obvious reafons then, of this infecurity, are

these, which they will best understand who are most employed in dissection.——We observe towards the decline of life, a change on the conditions of the whole arterial system plainly unfavourable to our operations. We find the arteries less pliant, sometimes contracted, sometimes enlarged, sometimes ossified, their coats always thick, and separating from each other upon the slightest touch. They are brittle and fragile, and have a crisped feeling, they have lost all their strength, our injections burst them, and our ligatures cut them across; in short, our anatomical injections go well or surely, only in the smallest arteries, or in the limber and pliant arteries of a younger subject: In subjects beyond the prime of life, they often fail. The anatomist knows by the first touch of the artery, when it is hard, that he needs not fix his tube there; and the surgeon often foresees also by the first touch of his finger in performing his operations, those terrible hæmorrhages, and burstings of the arteries, which occasion so much anxiety and distress. In subjects beyond the age of forty, we have more reason to be apprehensive, though we often see these changes in the arterial system, this tendency to dissolution, or at least to disease, very early in life *.

* Petit cut off the thigh of a gentleman, on account of a compound fracture, by which he had been confined eighteen months to bed, he found the Femoral artery so ossified, that his tourniquet had no effect upon it; his ligatures did not draw its sides together, there was no likelihood that caustics or cauteries, or any thing but continued compression could have any effect, and he was obliged to invent a machine having two plates, which, by the working of a screw, pres-

Thus, by the age of the ſubject, the arteries may want a diſpoſition to inflame; or by the thickneſs of the arterial coats they are not pliant, ſo that they cannot be put in contact; and, whether they have or have not the diſpoſition to inflame, they have not an opportunity of adhering—or by the greater caliber of ſuch an artery, its circle being wide in its natural condition, is puckered and unequal when it is tied; ſo that by this alſo it cannot ſo well adhere; and I am ſure, that the tapes which have been uſed for tying ſo great an artery, have often, when tied with the ſurgeon's knot, been larger in their diameters than the arterial trunk itſelf; and Mr. Duſchamps actually tells us of a ſurgeon, who could not draw his ligature ſo as to ſtop the artery, and was obliged on that account alone to cut off the limb.

Perhaps it is from natural and unavoidable cauſes like theſe, without ſeeking for any more curious explanations, that we are to explain the frequent burſtings of great arteries, as in the thigh or ham. We do not know all the cauſes, but thoſe which we do know, are ſuch as ſhould make us anxious and watchful in no common degree, with a continual and minute attention to every circumſtance in the tying of the artery.

Ulceration of the artery is the great, and almoſt the ſole cauſe of its burſting; for always the artery muſt be regarded as a part of the living body, ſubject to the ſame affection with the other ſoft parts. To enumerate a few of the cauſes of this ulceration of the artery, will ſuggeſt precautions very different from thoſe which have hitherto been practiſed; and will, perhaps, induce

ſurgeons to receive the oldeſt method of all, *viz.* that of tying the artery with two ligatures, and cutting acroſs in the ſpace betwixt them.

1. When a ligature is uſed too large for the occaſion, the ligature being ſtiff, firmly waxed, and unpliable, hardly compreſſes the artery even at the firſt, and no ſooner do the ſoft parts begin to die under the ligature, than the loop of it is found ſlack, the artery is not deſtroyed, nor its canal obliterated; the blood runs along, and iſſues as at firſt, from the wound of the artery.

2. The ligature, in place of being laid under the artery, after a fair and clean diſſection of it, is puſhed through among the muſcles and cellular ſubſtance, with a large and ſharp needle; in order to avoid the main artery itſelf, the needle is paſſed at ſome diſtance from it; the ligature is drawn firm, and the artery for the time compreſſed; but, in a few days, the ſoft parts under the ligature fade, and it loſes all command of the artery.

3. When, in this rude way, the great nerve is included along with the artery, the danger is not of that kind, which ſurgeons have uſually apprehended; we need not be afraid of convulſions and locked jaws; the tying of any artery is ſafe in this reſpect; but the danger is quite of another kind; it relates not to the nerve itſelf, but to the artery which is included along with it in the ſame ligature; for the nerve is an indeſtructible part; its firm coats defend it from the ligature; it is not compreſſed like the artery; it is not killed and mortified by the ſtricture; it never gives way to the ligature, and the ligature keeping its hold ſo

long, is ſure to produce diſmal conſequences; for this is the natural progreſs of the artery tied with a ligature; that it is ſtrangled by the ligature; the part thus ſtrangled, is ſoon to be cut off; but while the part of the artery betwixt the two ligatures, is thus cut off, the parts round which the ligature is directly applied, is only inflamed; the ſides of the arterial canal adhere; the canal of the artery is cloſed, before the ligature falls off. But when the nerve alſo is included in the ligature, the ligature holds its place; it keeps firm, even after the artery is cut acroſs; and, by keeping its hold too long upon the artery, the proceſs of inflammation is continued; the ulceration mounts upwards along the artery; and when it arrives at that point, where the channel of the artery is ſtill open, and when the ulceration weakens the coats of the artery, it burſts; and it ſometimes burſts from the progreſs of the ulceration, after the ligature has been drawn away.

4. On this, as on many occaſions, the ſurgeon forgetting that he is operating upon the living—forgetting that it is not the firmneſs of his ligature (which muſt ſoon be pulled away) that ſecures the artery, but that proceſs of adheſion of the ſides of the arterial tube which obliterates its cannal—The ſurgeon, forgetting that the artery is a part of the living body, and that his ligature operates only by conducing to a certain natural proceſs, is anxious about nothing but the mechannical firmneſs of his ligatures. In Hernia, the ſurgeon, in place of truſting the reunion of the inteſtines to the natural proceſs of adheſion, truſts to nothing but

enteroraphies, ſews the guts round and round with a double row of ſtitches, which can produce nothing but gangrene; and tying arteries, he truſts to nothing but ligatures, and uſes four ligatures, which can have no other effect than cauſing ulceration and burſting of the artery.

Firſt, When two ligatures only are applied, there is ſome chance of thoſe ligatures cauſing a mortification of the intercepted part of the artery, and an adheſion of thoſe points round which the ligature is applied, there is a chance that the ligatures will come away at the time when the two ends of the artery cloſe; that the inflammation will ceaſe, and the ends of the artery ſhrink among the ſurrounding fleſh, and mix with granulations of the healing wound.

Secondly, When the artery is tied with two ſuch ligatures, and then relays of ligatures, *i. e.* ligatures to be drawn tight upon the occaſion of any hæmorrhagy, are laid looſe under the artery, an inch above, and an inch below each of the ligatures—this attempt at ſecurity is the real cauſe of danger; with this operation, it is almoſt impoſſible that the artery, however ſafe at firſt, ſhould continue ſecure. For, when the firſt ligatures are performing this office of obliterating the artery, and cutting it acroſs, the occaſional ligatures are operating their worſt effects: They are not tight about the artery; they do not obliterate it, but they irritate the coats of the artery; they keep it inſulated; they infallibly cauſe ulceration;—and ſo inſidiouſly does this dangerous ulceration creep along the artery, that the blood often burſts out long after the ligatures are removed. Nor can you be ever aſſured of your pa-

tient's ſafety to the 20th or 30th day ; nor indeed till the wound is almoſt healed :—While there is a ſuppurating cavity in which the artery may lie ulcerating, you never are ſecurely ſafe.

From this theory, I am perſuaded, that the uſual practices for ſecuring an artery, are the chief cauſes of danger. That the more mechanical ingenuity the ſurgeon exerts, the more is he expoſed to the moſt diſtreſſing accidents. Every attempt at mechanical ſecurity, is likely to produce ulceration of the arterial tube; and the ſtripping of the artery of much cellular ſubſtance ; the ſeparating the arterial tube from the bed of cellular ſubſtance in which it lies, and from the veſſels by which it ſhould be nouriſhed ; the laying pieces of cork under the ligature ; the uſing pieces of tin-plate ; the laying pieces of bend-leather under the artery, and the uſing machines like that of Mr Duſchamps*, for ſecuring the great arteries ; and, moſt of all, the laying a ſucceſſion of ligatures under the artery, are ſure to produce ulceration and ſecondary hæmorrhagy.

Thirdly, When we conſider the difference in the ſecurity of an artery tied in aneuriſm, and tied in amputation, the one the moſt ſecure, the other the moſt uncertain operation in ſurgery, we cannot but ſuſpect that the cauſe of inſecurity, in aneuriſm, is merely from the inſulated condition of the artery: for, from the great ſize of an aneuriſmal ſac, from the quantity of blood effuſed round the wounded artery, and from the

* Vid. Fourcroy.

destruction of the cellular substance, it is separated from all those vascular connections which should keep it alive and in health, and the operations usually practised upon the wounded artery serve but to insulate it the more. When those things are considered, perhaps, the oldest operation of all will be found the best, *viz.* to find out the artery, and tie it with two ligatures; cut it across betwixt them, and allow it to shrink, and bury itself among the surrounding flesh.

It is surely a point of the very first importance, to have the wounded artery sooner buried in granulations and in sound flesh; for though the healing of an artery depends always in part upon its own lively disposition to adhere, yet it must depend also in some degree on the support of surrounding parts. Bleeding from a tied artery seldom comes on till the 4th or 5th day; and if we could here, as in other great operations, lay the skin down and make it adhere before the 6th, or before the 12th, or even before the 26th day, (as my late observations explain to you), we should have it all sound before the usual period of bleeding; but the surface is often large, the suppuration bad, the artery lies exposed, and may be dilated, or it must be eroded by the foul pus. Birche says, it was where the great artery of the thigh seemed to have ulcerated, that his injection ran out. Hume seems to attribute the death of his friend's patients to great suppuration, formed round the bed of the artery; and certain it is, that Hunter succeeded better, when in some cases he closed up the thigh immediately with stitches; for, in one case he procured almost an immediate adhesion of

the wound, and in a few weeks a perfect cure.—Parée, Guy de Chauliac, and all the older surgeons, knew well the importance of surrounding and supporting an artery, and burying it quickly under the granulations. The Arabians, in their operations for aneurism, first tied their ligatures, and then cut the artery across, so that either end of the artery shrunk (surrounded by its own ligature) in among the sound flesh, and was no more seen. But, independently of all authority, the reason of the thing instructs us not to keep our wounded artery, as some choose to do, open, that they may see it and tie it when it bursts out, but to bury it so among the rising flesh that it may never be seen, and that in a few days it may be safe from bursting.

After all that can be said or done in explaining this bursting of arteries, from disease, this strong indelible impression must dwell upon our minds, that there must be some imperfection in our way of operating; or not to mince the matter, there must be something absolutely wrong in our operation. Some cases are so managed, that one surgeon dare say of another, that it was supposed that the artery was tied; and can use this plain expression after the dissection of the limb. But there is this better reason still, for saying that there is something radically wrong in this operation, for in all our other operations with the needle we succeed. What then can the difference be, betwixt this tying of the Femoral Artery in aneurism, that it is so full of uncertainty and imminent danger; and the tying of the

ſame artery in amputation, where the ſurgeon thinks the death of one patient by hæmorrhagy a flagrant diſgrace? Or, why is it, that although in an amputation of the thigh, we tie the Femoral Artery itſelf; though we tie alſo the Profunda, or four or five of its greateſt branches; though the ſtump often continues open; though the arteries are unſupported; though a great ſuppuration, and often a very acrid one, enſues; and although the arteries continue in this dangerous condition for fifteen or twenty days; yet our tyings ſeldom give way! I fear that the difference is no other than this, that in amputation we have our tourniquet about the limb; we look upon the broad ſurface of the ſtump; we ſee the naked arteries, draw them out fairly from among the fleſh, tie them ſteadily and deliberately with a ſmall ligature; and whatever afterwards befalls ſuch a ſtump, if it do not fall into abſolute gangrene, or ſomething near it, the arteries are ſecure: While, in the operation for any great aneuriſm, we ſometimes have no tourniquet; the compreſſion does not ſtop the blood; the patient faints before half our buſineſs of cleaning the ſac is over; or the parts are ſo maſſed with inflammation, that the artery is never either well ſeen or ſecurely tied; the patient is loſing blood during every moment of this ſeeking for the artery; at laſt he faints, and the ſurgeon in great alarm ſtrikes his needle among the fleſh and ſuppreſſes the bleeding for the time; and thus it is, that in the end the caſe terminates ſo, that it is ſaid, "No one doubted at the time, that he had tied the Femoral Artery;" while it is plain that he had not, from the event of the caſe. In this ſtate of the buſi-

neſs, then, we are hardly entitled to talk about diſeaſed ſtates of the arteries, which after all ſhould be as frequent in amputation as in aneuriſm. We had beſt lay down a reſolution of running all riſks, in cutting new arteries, rather than not diſſect the artery clean. Let us diſſect it clean, and then tie it as fairly as in an amputation of the thigh; and if this really fail, then let us return to our experiments and ſpeculations, and endeavour to find out the cauſe.

DISCOURSE IV.

OF THE BLEEDINGS FROM THE SMALLER ARTERIES;

WITH SHORT HISTORIES OF THE OPINIONS CONCERNING THE STOPPING OF HÆMORRHAGY.

By the wounds of the ſmaller arteries, I mean thoſe of arteries of the ſecond order, as of arteries in the fore arm or leg; not ſo large as to produce great and dangerous aneuriſms; but ſtill of ſuch importance, as ſometimes to occaſion the patient's bleeding to death.

Sometimes the patient is bleeding from a broad and open wound, and falls down with the loſs of blood; he is for the preſent time ſaved by fainting, but by repeated hæmorrhages his conſtitution ſuffers, or he even bleeds to death; and very often, ſuch ſucceſſive bleedings from a ſmall artery, or too often the want of ſkill in the ſurgeon, are here, as in the greater aneuriſms, the ſole reaſon for cutting off the limb. Sometimes the artery is wounded obliquely; and the ſurgeon, never able to ſee the real place of the wound, attempts ſome confuſed or irregular operations, till, the patient loſing blood, from day to day, grows languid and low, and after ſome ſudden return of the hæmorrhagy, faints and expires.

Sometimes alſo the arteries are wounded deep among the muſcles; and there the blood corrupting the muſcular fleſh, or even ſpoiling the bones, is the occaſion, (after long ſuffering) of the patient's loſing often his limb, and ſometimes his life, although he ſhould even eſcape all preſent dangers from the immediate loſs of blood.

Under theſe, as the chief heads of my diſcourſe, I ſhall explain to you all that remains of this moſt intereſting ſubject. For whether I conſider the ſuddenneſs with which theſe embarraſſing accidents overtake the young ſurgeon; or the frequency of the accidents themſelves; or the preſent or the remote conſequences of ſuch a wound; or the ſtrange things that we read every day, of wounded arteries managed in a trifling undecided way; of patients dying, or loſing their limbs, even from wounds of the Radial Artery at the wriſt; of ſurgeons unprepared, uncertain what they ſhould do, ſometimes diving clumſily with their needle among the fleſh, ſometimes thurſting a ſponge into the wound, ſometimes laying clumſy compreſſes upon the artery, with little better ſkill, and no better ſucceſs than the friends could do; and worſe than all, of ſurgeons expoſing themſelves, by holding conſultations, to determine what next to do, or whether to cut off the limb;—I cannot but think this ſubject very important: And as it is important, I believe it will be well to explain to you firſt of all, the only thing, which ſtands to this ſubject in the relation of a general doctrine, viz. the opinions of authors, concerning the various ways in which bleeding arteries are cloſed,

(whether by the formation of a clot, or whether by the retraction of their open mouths, ſhrinking among the fleſh); for upon this hiſtory of opinions there follows, in moſt natural order, a ſhort hiſtory of the means that have been uſed for ſecuring arteries, as ſtyptics, compreſſion, ſponges, and the needle: But yet on this, as on many occaſions, it is really the practice that ſuggeſts the doctrine, which then aſſumes a moſt impoſing appearance, and ſeems to be itſelf the root of all the improvements in practice *.

Mr. Petit was the firſt who called the public attention to a point of practice, which was of particular importance, at a time when the practice of tying arteries was not fully eſtabliſhed, when ſurgeons ſtill had their fears, and were ſtill talking about convulſions, and the

* The juſtly celebrated Mr. White, relates the conſequences of bleeding from the Radial Artery, in the following terms. "The arteries of the wriſt having been cut, had been twice taken up by Mr. ———, a ſurgeon well accuſtomed to the operation; and Boviſta and many other things had been tried. After each of theſe methods, the hæmorrhagy ſtopped for a few hours, and then frequently burſt out again; eſpecially upon the acceſſion of a hot fit, to which he was now very liable. On the 7th day, I was called in conſultation with Mr. Allan, to take off the arm: we found his hand and arm ſwelled to three times its natural ſize, from the frequent uſe of the tourniquet; which had been under a neceſſity of being moved to different parts of the arm, on account of the excoriations it had occaſioned. For the laſt 24 hours, it had been applied almoſt without intermiſſion, from a dread of his bleeding to death, as he had loſt a prodigious quantity of blood. After the dreſſings and clotted blood were removed, we could diſtinctly ſee the mouth of the veſſel, throwing, per ſaltus, what I can ſcarcely call blood, as its colour could hardly be diſtinguiſhed upon linen."—White's Cases.

yielding of the ligature, debating hotly the danger of this operation:

Mr. Petit believed, that every bleeding artery was ſtopped, only by the formation of a clot; aſtringents made clots, by coagulating the blood; ſponges, boviſta, charpie, made clots by abſorbing the moiſture; compreſſes made ſurer clots, by ſhutting the mouths of the arteries, and by allowing time for the coagulation of the blood; and even the tying of arteries was uſeful chiefly by forming a clot, but leſs ſecure, ſince whenever the ligature came off, from the artery, the clot was looſened, when often there was a ſlighter bleeding, from blood paſſing by the ſide of the clot, and ſometimes there was a full hæmorrhagy, from the clot being driven forwards, and at laſt expelled by the blood. In a tied artery, ſays Petit, we have a conical clot; in an artery which has been compreſſed, (ſince the artery is flattened like the reed of a hautboy), we have a flattened clot: In arteries ſtopped by charpie or aſtringents, we have a clot formed, partly by the contraction of the mouth of the artery, partly by the effect of the dreſſing, ſo that ſuch an artery is ſtopped by a ſort of double clot, of which there is one part ſmall and conical, which, like a plug or cork, fills the canal of the artery, and another adhering to the dreſſings, of a flattened form, lying like a lid or cover over the mouth of the artery, but ſo connected with the other, that the rude or early removal of the dreſſings, pulls out this cork-like clot.

The chief of Mr. Petit's obſervations, for proving the authenticity of this doctrine, was this, that in diſ-

fecting the thigh of a man who had died five days after amputation, he found in the great Femoral Artery, a large and folid clot. This he prefented to the Royal Academy of Sciences in great pomp: But I believe it were no difficult matter to prove, that this great academy of the great King of France, Louis Quatorze, was very eafily fatisfied with prefents of this nature; but rather than fpeak this kind of language, I fhould choofe to fay, that fuch a proof does not prove his very dangerous doctrine. It is a fact, which every one would do well to admit eafily, whether he do or do not like the doctrine: for it is not likely, that the mouth of an artery fhall be ftopped up after amputation, without the blood being coagulated behind the ligature; nor is it likely that the arteries fhould all lie dead for fome days in a gangrened limb, without the blood alfo lying ftagnant in thefe motionlefs arteries, and coagulating of courfe. We are not therefore furprifed to find many proofs of coagula being formed in every artery of a gangrened limb, or in the chief arteries of an amputated ftump, or in the artery which has been tied for aneurifm; nor are we furprifed, on the other hand, if in many diffections no fuch clots are found. It is an accident plainly; no furgeon depends entirely upon a matter of fuch chance as this; no furgeon fcarifies a gangrened limb, without having fome thoughts about its great arteries, nor is there any furgeon almoft, who has not feen very dangerous bleedings, from imprudent fcarifications of fuch a gangrene. Why then fhould Mr. Pouteau *, be at fo much pains

* Vid. Pouteau, page 306.

in denying accidents like these, feeing that fuch clots are both fo likely to happen, and are really fo well proved by Hunter, and others; and feeing that the formation of fuch clots, has fo little to do with that doctrine which Petit wanted to eftablifh, and which Mr. Ponteau wifhed fo earneftly to refute. The proving that clots are formed in arteries, is no proof that it is the clot only that clofes fuch arteries; but rather, that it is the clofing of the artery that forms the clot. The next proof that Mr. Petit gives of his doctrine, is really very ludicrous; for he next proceeds to fettle the value of the various abforbents, by a long fuite of experiments, which he conducted in the following manner:—"Aftringents and fuch fubftances, as ufually are employed for ftaunching the blood of wounds, furely muft do fo, fays Mr. Petit, chiefly, by abforbing that humidity, which lies between the veffels and the flefh*." Petit made all his aftringents abforbents, chiefly that they might drink up the thinner parts of the blood, and fo help to form for him good, ftiff, folid clots: he puts lumps of mutton into tea cups, with a reafonable proportion of the following aftringents: firft of common bole, then of terra figillata, which is a finer earth or bole, then of Paris plafter, then of flacked lime, then of various gums, then of gum-arabic, then of vitriol, then of falt, then of fugar, and laft of all, of fpider's webs; and obferves, with moft curious precifion, the exact degree in which each of thefe ufelefs foolifh things contracted, or hardened the lumps

* Vid. Academ. des Sciences, Ann. 1732, page 321.

of mutton; which experiments are ſtill extant in excellent French, in the Acts of the Academy of Sciences, for the year 1732; a perfect burleſque upon ſuch experiments, and ſuch ſubjects: And towards the end of this moſt philoſophical paper, Mr. Petit inſerts this wiſe caution, which completes the joke. "But all theſe aſtringents muſt of courſe abſorb more humidity, and act in a more lively and perfect manner in the living body; whoſe parts are always warm, and always ready to put themſelves in motion, by the force of the *animal ſpirits*, which are continually flowing *." But I ſhould want all apology for this long account of Petit, and of his doctrine, if it were not that it is a dangerous doctrine, and had abſolutely led Petit himſelf into great miſtakes; he perſuaded himſelf that the ligature was hardly more ſecure than any common means of ſuppreſſing bleeding; that it was only ſo far uſeful, as it enſured a firm and conical clot; that if the ligature fell off before this clot was fully formed, and perfect in its office, the artery would bleed. He therefore preferred the uſe of a compreſs, to that of a ligature, even in ſecuring the arteries of a great ſtump: And we find him boaſting, that though this method, viz. of compreſſion, is the oldeſt of all, he will give to it all the effects of novelty; and ſince it is the moſt natural way, and the very means which ſhould have preſented itſelf, firſt of all, to the imagination of the

* Tous ces aſtringents doivent abſorber plus d'humidité, et agir plus efficacement, ſur les parties d'un corps vivant, qui ſont chaudes, et toujours pretes a ſe mettre en contraction par les eſprits animaux qui y coulent inceſſamment.

furgeon, I will reftore it, fays Petit, and fet it up above all other means; as cauteries, aftringents, fponges, or even the ligature itfelf*." There is not one of all thefe, fays Petit, that is fufficient of itfelf; we muft ufe the comprefs, to affift even the ligature.

We have here a moft curious example of a man's genius and his good fenfe at variance with each other. His theory feduced him, his good fenfe would have kept him right; we find him forcing himfelf, as it were, to fay, "I will ufe the comprefs in preference to the aftringents, ftyptics, cauftics, or even the ligature itfelf, wherever it is poffible for me to do fo †;" which is plainly acknowledging, that he would ufe that kind of uncertain operation, to which his theory inclined him, wherever he was not forced by the immediate danger of the cafe, to return to fome furer means of reftraining the blood.

And in one particular cafe, where after amputation of the thigh, the great Femoral Artery had by a fudden motion of the patient, given way; we find Mr. Petit fo averfe to the ufe of the needle, that he would not tie this artery a fecond time, he kept his patient for many days in a very unhappy and very dangerous condition; attended by four young furgeons, who relieved each other every hour, continually preffing with the point of the finger upon the mouth of the artery; till at laft, he got a machine made, a fort of clumfy

* Vid. Pofthumous Works, page 164. Vol. III.

† Soit par rapport a l'ufage exclufif que je lui donne, en rejettant celui des aftringens, des ftiptiques, des cauftiques, et de la ligature même, AUTANT qu'il EST POSSIBLE.

complicated tourniquet, which, by the help of two broad plates, kept up a firm compreſſion upon the whole face of the ſtump.

If theſe practices, and the invention of ſuch machines, are to be the beſt fruits of ſuch doctrines, we ſhould be careful how we receive the other doctrines which have followed this in a rapid ſucceſſion.

Next comes Mr. Morand, who adds his little bit of a doctrine to Mr. Petit's, which, whether true or falſe, was framed upon a grander ſcale. "No doubt," ſays Mr. Morand, "Petit has explained vaſtly well how the clots ſtop bleeding *, but theſe clots cannot be the worſe for ſome help from the artery." I think I ſhall be able to give you a tolerable idea of what his confuſed notion was, in one ſingle word: For, it was neither that contraction of the diameter of the artery, which has been ſince then ſo diſtinctly made out by Kirkland, White, and many of our beſt Engliſh ſurgeons; nor that retraction of the artery among the ſurrounding fleſh, which has been ſo much inſiſted upon by Pouteau and other good authors; but an equivocal generation betwixt theſe two ideas floating confuſedly in the man's mind. You have his notion all at once, when I tell you, that the word by which he always expreſſes it, is the criſping up of the artery, "par la criſpation du tuyau:" And he can tell no more about it, than that this cabaging of the artery aſſiſts the clot.

* Memoirs de la Societé Royale des Sciences, An. 1736, page 321.

Next came Mr. Pouteau, whofe experiments and reafoning approached indeed nearer the truth; but always a man reafons firft, and makes his experiments after; and this is plainly the light in which his diffections are to be viewed.

"I have diffected a Femoral Artery, fays Mr. Pouteau, three weeks after it had been tied in amputation; but in it I found nothing of Mr. Petit's clot; nothing to clofe or comprefs the artery, except merely the thickening of the furrounding cellular fubftance; for the ligature was loofe about the artery. The canal of the artery was conical, for it grew narrow nearer to the ligature. Immediately under the ligature it was not obliterated but was much ftraitened: It was only below the ligature that it was entirely ftraitened, ending in a blind fac." This ftraitening of the arterial tube was accompanied, or rather, according to Mr. Pouteau, was caufed by a thickening of the furrounding flefh: for the flefh which furrounded the ftraitened part of the artery, was a good deal gorged and fwelled; that which lay immediately under the ligature, was in a ftate of gangrene; the flefh again which adhered about the mouth of the artery where it ended in the blind fac, was of a cartilaginous hardnefs and much fwelled. Of courfe, it was Mr. Pouteau's opinion, that it was the fwelling of the furrounding cellular fubftance that compreffed the artery and ftopped the blood.

This, then, being the doctrine of Mr. Pouteau, his practice follows his doctrine reafonably enough: for, fays Mr. Pouteau, "Let it be once proved that it is the

ſwelling merely of the parts ſurrounding the artery that prevents the blood, it follows of courſe, that the greater the bundle of fleſh that is accumulated round the artery; the more of the parts you include in your ligature, the greater the ſwelling muſt be, and the reſiſtance to the irruption of the blood muſt be proportionably great*.

Mr Pouteau is cunning enough to ſhow us only an arterial trunk tied coarſely with the needle, with much cellular ſubſtance ſurrounding the artery above the ligature, and ſome below; and thus he takes his opportunity of inſinuating his doctrine, by ſaying, "there was much cellular ſubſtance thickened above the ligature, and there was a like thickening of the cellular ſubſtance below; and the artery was not obliterated at that point where the ligature was, but only its mouth was cloſed."

But what is to be ſaid of thoſe caſes, where there is little cellular ſubſtance ſurrounding the artery above, and none below; where the artery is drawn out with the tenaculum, and tied clean of all the ſurrounding fleſh, and what would happen in this caſe, if the artery were not obliterated at the point, where the ligature compreſſed its coats? This doctrine of Mr Pouteau's, ſeems at leaſt to be harmleſs; it ſeems to inculcate the tying of arteries with the needle in the ſureſt way.

* Mais s'il eſt une fois avéré que le gonflement des parties au deſſous de la ligature, fait le principal obſtacle a l'irruption du ſang arterial, il ſera naturel de conclure, que plus ce gonflement ſera conſiderable, et plus il oppoſera de reſiſtance a l'impetuoſité du ſang arterial.

But, here alſo there is a villany inſeparable from all falſe doctrines, which lead us unawares into very dangerous and very extravagant practices, ſuch as in our cooler moments, we cannot remember but with regret. Mr. Pouteau inſiſted upon including all the parts; he had no ſcruple, under this ample title of all the parts, to include the nerves; he conſidered the tying in alſo of the nerve, as a ſecurity to the tied artery, or I fear rather, he conceived that it would be a ſecurity to his doctrine; and ſo he proceeds to repreſent the tying of the Radial Nerve in an aneuriſm, as nearly harmleſs, and the tying the extremity of the nerve in amputation as quite ſo; till at laſt, hardened by bad practices, and blinded by doctrine, ſome ſurgeons of the very higheſt character came, as it were, to play with our judgment, and to ſport with their patients feelings, ſaying: "May not the pain upon tying a nerve, as it is ſmart and of ſhort duration only, ſomewhat in the manner of volatiles applied to the noſe, rather *enliven* the *ſpirits*, than bring on convulſions *." This is enough to cure any ſenſible man of any inclination he may have indulged, to hearken to thoſe who blend theory and facts in this ſtrange faſhion, who compare the ſmart pain, or rather as I would term it, the ſhock and terrible violence of tying a nerve with ſo ſlight a matter, as the ſnuffing hartſhorn up the noſe. Let any man who will talk to me on this point, firſt demonſtrate that the tying in of the nerve will do good, before I cloſe with him upon the ſecondary queſtion,

* Kirkland, p. 22.

whether it may not do harm. I have conſtantly obſerved, that the tying of a nerve gives immediate pain; ſo that the patient has always cried with the anguiſh of it; and to ſay the leaſt of it, there is ever a ſlow ſeparation of the ligature, ſo that it is not to be got away, till it be cut out. How elſe indeed ſhould any ligature hold its place, upon an amputated ſtump for three weeks, as this of Mr. Pouteau did, unleſs it were tied round the nerve? I have ſeen ſuch conſequences ariſing from tying the nerve in aneuriſm, as I am not at preſent entitled to explain; but which make it a duty with me to adviſe you againſt this practice, which is at leaſt ſuperfluous, if not hurtful.

Amidſt all this confuſion of opinions, there was engendered here, in England, a new doctrine, about the contraction of arteries; bearing no other mark of authenticity, nor any thing elſe to command one moment's attention; but that it has been embraced by ſome of our moſt able ſurgeons, eſpecially by Mr. Kirkland, and by the celebrated Mr. White; " For I am now convinced, ſays Mr. White, in oppoſition to the doctrine of Mr. Pouteau, which once ſeemed more probable, that according to the ſuppoſition of Mr. Gooch, ſince confirmed by my ingenious friend Mr. Kirkland, the arteries by their NATURAL CONTRACTION, coaleſce as far as their firſt ramifications *."——— Mr. Kirkland ſays, in perfect harmony with Mr. White, " that nature ſuppreſſes the hæmorrhages from divided arteries, by the natural contraction of their muſcular

* Page 171.

fibres," p. 10 †. But if it really were so, this conclusion should follow, more dangerous than the rash conclusions of Mr. Petit, that the compress or the slightest astringent would be more effectual than the needle; and that keeping the point of the finger for a few minutes upon the point of any smaller artery, until it had time to contract, would be quite sufficient to stop the blood.

This contraction of the artery, an accident which cannot or need not be denied, does more harm than good; if it ever suppress bleeding, it must be only in arteries of the smallest order, the bleeding from which stops thus spontaneously, and needs no particular care.

† Mr. Aitkin Warrington, is also of the same opinion, as may be seen in his Pamphlet, p. 173, where he says, "That the obliteration of the sac, in the extremity of the artery, is caused by its *natural contraction*." They have been at great pains, to found this doctrine on principles and facts. The only facts, are the docking of horses tails, and the cutting off their legs. These are to be found in Mr. Kirkland's Treatise; and the only principle, that is to say, the only general fact, which I have ever yet been able to discover, is, that an artery closes, not only immediately under the ligature; but for a considerable way above, that is, up to the nearest inosculating branch. The closing under the ligature is plainly the work of the ligature; the obliteration of the canal, higher than the ligature, is supposed to arise from this contraction of the artery. The explanation that I should choose to give of the appearance, is this: That the contraction under the ligature could not be permanent; that the artery would open the very moment the ligature was withdrawn, if its sides had not adhered. The closing under the ligature, therefore, I consider as the adhesion, which follows the stricture. The obliteration above, I consider as a thickening, or continued adhesion, by the inflammation going a little forward along the arterial coats.

But the contraction of a larger artery often ſtops the bleeding for a time; its retraction among the cellular ſubſtance hides from the ſurgeon the arterial mouth from which the blood had flowed; and thus it bleeds again unexpectedly, endangering the patient's conſtitution, or even his life; if the ſkin heal over it, it forms aneuriſms under the ſkin; or, where the ſkin has not healed over it, I have ſeen it form a ſort of aneuriſm among the ſoft granulating fleſh.

From all that we have ſeen, we have reaſon to be jealous of any doctrine, which leads to a laxity of practice, in reſpect of tying even the ſmaller arteries; or which holds out any ſuch apology, as the contraction of arteries, or the formation of clots. No modern ſurgeon, I believe, would think his buſineſs ſecurely done, while he conceived any great artery to be ſecured merely by a clot; nor will any ſenſible or cautious man be eaſy, when he has miſſed a bleeding artery, or while he is waiting till it contract: Nor will any man who has that degree of dexterity and boldneſs, which the management of bleeding arteries requires, be ſatisfied, until he has tied every artery fairly, unleſs it be in ſome very difficult or dangerous place; for it is only to the ADHESION and total OBLITERATION of an artery, that we can truſt with ſafety: How this is beſt to be procured, may, I think, be made very plain.

We find an artery as capable of inflammation, as any other part of the body. We find an artery deſcribed by Mr. Hume as inflamed, not only at the point, where it was tied for a Femoral Aneuriſm, but alſo onwards from that point quite up to the heart.—If an artery, inſen-

fible as it is, be thus fufceptible of inflammation, we know, *a priori*, that the tying it fo hard, as almoft to cut through its coats, will always, or almoft always, make it inflame. We have it proved by Pouteau, Kirkland, and others, who intended to prove nothing more than the contraction merely,—that its coats are thickened, and that its canal is obliterated under the ligature, and contracted above it, to a degree which their doctrines of natural contraction or retraction of the artery will never explain: All this is proved by furgeons, who continued talking about the contraction and the retraction of the artery, after they faw evidently, that the internal furfaces of the artery had adhered *. And finally, the procefs, as it goes on in nature, is plainly declared by the effects of our common operation of aneurifm of the arm; for there we apply two ligatures, which include the length of two inches of the Arterial Trunk; they are drawn tight upon the artery, one above the point wounded by the lancet, and one below; and both thefe ligatures come away

* "Another woman, fays Mr. White, having died three weeks after the amputation of her [redacted]; I was defirous of feeing in what ftate the arteries were, after the ufe of the fponge; and for this purpofe, laying bare the Humeral Artery, I cut it open to the place where it divides into the radial, and ulnar branches: I then introduced a common filver probe into each branch, which paffed very eafily to a certain point, which feemed about an inch from the extremity of the ftump; but could go no further. I next laid open the arteries to their extremities, and found them entirely clofed, near an inch from the end of the ftump; but from that point upwards, their capacities were not at all diminifhed, nor was there any coagulum or clot of blood in the veffels, or any where near them." Vid. WHITE'S CASES.

eaſily (and without our cutting the ring of the ligature) upon the third or fourth day.

How is it that they come away ſo eaſily? How is it thus poſſible, to remove them, without cutting open that ring of each ligature, by which the artery was encircled? What becomes of the interrupted part of the artery itſelf?—Surely it happens here, as in all other caſes, in which we apply a ligature, that the part intercepted by the ligatures is killed! Firſt, The pulſe ceaſes upon drawing the knot of each ligature, which proves that the ſides of the artery are compreſſed. Next, The intermediate piece of the artery is fairly killed, rots like a polypus tied in a nooſe; and, as a polypus fades on the ſecond, and drops away on the third or fourth day; in like manner, this artery decays, mixes with the pus, leaves the ligature ſlack on the ſecond, and allows them to be withdrawn eaſily by the fourth or fifth day. And moreover, it is very obvious, if the artery be thus cut acroſs by our ligatures, as fairly as the older ſurgeons cut it acroſs with their knife, that its two ends muſt each have adhered; otherwiſe, upon drawing away the ligatures, a hæmorrhagy muſt enſue. Mr. Petit warns us that even the ligature is inſecure; for if the ligature, ſays he, falls off before the clot within the artery be ſtrong in its office of ſtopping the artery, the artery will bleed: But this premature falling off of the ligature, which he apprehended, cannot happen until the ligature has done its buſineſs effectually; or in other words, one part of the artery will not rot, or give way, before the parts of the artery above and below the ligatures have adhered.

Perhaps the whole procefs may be reprefented in few words. The ligatures operate, by making the feveral points of the arterial canal pafs through the feveral ftages of inflammation, from adhefion in one point, to gangrene in another. The fpace included betwixt the ligature falls into gangrene; the fpace immediately under the ftricture of each ligature adheres, (the ligature and the adhefion preventing the gangrene from paffing higher along the canal); and by this inflammation extending upwards and downwards along the artery, its walls are thickened, and its canal obliterated a little beyond the ftraitened point *. The adhefion

* We find the following account of this procefs in Kirkland, p. 5. " An aneurifm of the arm, being in great danger of burfting, obliged me to perform the operation: The impulfe of the blood againft the igature, at the time of the operation, was very great; and as a part of the artery (whofe diameter was confiderably enlarged) was expofed, its pulfations were vifible; but upon removing the dreffings the third day afterwards, the pulfation could neither be feen, nor felt nearer to the ligature than an inch and a half; whence I was led to conclude, that the artery had *collapfed* and *gradually clofed* itfelf up to the neareft lateral branches."

I have obferved, after I had performed the operation for aneurifm, that on the third day, no pulfe was to be felt at all in the wound; but I never confidered this as in the leaft wonderful, feeing how very probable it is, that by that time, the ligature muft have cut acrofs the artery, the artery muft have fhrunk, and its canal muft been obliterated confiderably beyond the place to which it has fhrunk. But there is alfo another thing particular that Mr. Kirkland, and Mr. White infinuate npon all occafions, that the artery is obliterated juft up to the firft inofculating branch, and always up to it. Mr. White fays,— " In the arm I have by me, on which the operation for aneurifm had been performed, it is plain to a demonftration by the injection, that

of the artery and obliteration of its canal, are, in aneurifm as in amputation, or in other wounds, the only fecurity againft bleeding; and the ligature or comprefs is the only way in which fuch adhefion can be enfured; and there needs no more than two fhort rules on this fubject, the tendency of which is very plain.

1. If we are to try it with compress, let it be chiefly in thofe accidents, and in thofe parts of the body, where we have a good refiftance, as in the temple, the wrift, the tarfus or fore part of the foot, where we can feel the artery lying naked upon the bone. Let the compress be a firm and hard one, fteadily applied, well preffed with a roller, fo fixed as not to permit one drop of blood to pafs along the canal of the artery, nor to efcape from the wound; for that would defeat the intention. Let there be a tourniquet round the limb, and attendants appointed; for fome have died during the night *. Let this compreffion be continued thus

the artery was clofed, both above and below the ligature, to the next lateral branch."

His preparation was at that time, the only one in exiftence; "but I have now by me," the preparation from the arm of a man who had formerly had the operation for aneurifm performed upon him, and it is fo particularly like Mr. White's, that if I were to give a drawing of it, it would be thought to be a mere plagiarifm; but in this very curious point it differs, that the injection, though coarfely done, and in great hurry, has paffed the great inofculation, (for in my preparation, there is but one great inofculation to fupport the limb), it paffes it a full inch and a half, terminating in a blind fac.

* We find, in the following tranfcript from Murray, two very fingular things: In the firft place, we find two patients allowed to die of bleeding, during the night, after fome awkward attempt at curing the

ſteady till the fourth or fifth day, for that is the term which we find neceſſary for obliterating the artery and enlarging the inoſculations in aneuriſms of the arm; and it is ſufficient: for we find the dilated artery of the thigh itſelf, obliterated by compreſſion on the fourth or fifth day. Be bold enough alſo, if it be the great arterial trunk of the limb, to draw your rollers till the limb be abſolutely without pulſe, and cold: for this

aneuriſm of the arm, in which, according to the oldeſt faſhion, they had tried compreſſion not above the ſkin, with the hopes of ſaving their patients from the pains and horror of a bloody operation; but had firſt cut up the aneuriſmal tumor, and then inſtead of tying the artery with a ligature, had applied a compreſs, and applied it ſo inſecurely, that both the patients, from ſome unwary motion in ſleep, had bled to death during the night. This is his fact; and his opinion, as it is plainly implied in the following words, is very curious. "If your compreſſion be too powerful, in place of ſaving the artery, you will abſolutely obliterate the artery; but if you compreſs lightly with deſign of ſaving the artery, you are never out of danger of an alarming, or even fatal hæmorrhagy." This language very clearly implies, that Murray, like moſt others, expects from compreſſion not an obliteration of the artery, but thinks, as Heiſter did long ago, and Mr. Morrand more lately (Vid. Acad. des Sciences, Vol. V. p. 172. Octavo), that the compreſs, by ſuppreſſing the quick motion of the artery, heals the wound.

"Murray ſpeaks thus: Fruſtra itaque, ſi firmam compreſſionem inſtituimus, conſervationem arteriæ expectamus, in leviore autem, qualis ad ſcopum obtinendum requiritur, hæmorrhagiæ repetitæ quæ chirurgi animum quam maxime ſollicitant, atque etiam ægrum ad ultimam ſæpe metam detrudunt, vix evitari poſſunt, leviori ſub ſomno, motu brachii, quo compreſſio aliquantum fuit perturbata, binos ægros Montiſpeſſulani vigeſimo poſt operationem die, hæmorrhagia exitiali correptos fuiſſe, narravit cel. Præſes. (*viz.* Murray.")—Vid. Arvidſon Murray, p. 20.

operation with the compress, though apparently milder, is quite the same with tying the artery with the needle.

2. If it be your design to obliterate the artery by ligature, your business is more easily and surely, and rather more quickly done. You must see your bleeding artery fairly, tie it clean and clear of all surrounding parts; tie your arteries with ligatures well proportioned to their size, not clumsy and rigid, but rather small, perfectly flexible, and moistened with oil, that they may glide easily; draw them pretty tight, so at least as to lay the sides of the artery in contact, and till you see a pulse above your ligatures, and none below; but never draw them so as to run the risk of cutting the artery.

Hence, I think, the general conclusion is, that if you understand the principle of your operation, and do it with the proper precautions, you will be sure to make good your point, whether you tie, or whether

All authors have believed, that when they cured aneurism by compression, or by sponges, they healed the wound of the artery. Mr. Morrand of the French Academy, says in the following passage, that he cured an artery wounded with the lancet, in a manner very different from that in which we use the ligature. "I need not, says Mr. Morrand, mention the several precautions which I took after applying Mr. Brossard's agaric to the artery." I shall only observe, that the pulse, which was interrupted for twenty hours, returned at the end of that time, and that I cicatrized the wound in a month." "Je dirai seulment que le poulx intercepté a la main pendant environ vingt heures, se manifesta au bout de ce temps la," &c. p. 168. I dare say my reader has a tolerable notion what this interruption of the pulse means; and what Mr. Morrand was doing with his puff-ball.

you compreſs the artery; and this eaſy adheſion of an artery, I take to be the chief reaſon why every man hitherto has been pleaſed with his own little diſcoveries, and every ſurgeon is ſtill pleaſed with his own methods, whether they be or be not perfectly regular and correct.

MAHARAJA SERFOGI'S SARASWATI MAHAL * THE TANJORE

But, in this great ſubject, there is yet more to do; for there are many accidents in which we cannot operate with the compreſs or with the needle, in which we muſt uſe the ſtyptics, puff-ball, or ſponge: And of courſe, it may be right to give you a ſhort account of theſe means of ſuppreſſing bleeding, for diſputes about the cauſes by which bleeding arteries are ſtopped are uſeleſs, and to thoſe who delight in them, endleſs; unleſs there were found ſome one Catholic authority, by which the points might be ſettled at once: But we ought to be chiefly deſirous of knowing the means by which this end is accompliſhed. Though there are four chief methods of ſuppreſſing hæmorrhagy, viz. cauteries, aſtringents, fungi, and the ligature, there is one only, viz. the ligature, that is abſolutely ſecure.

1. Burning Irons were uſed by the ancients, merely becauſe they knew of no other means of ſuppreſſing the bleeding; and we cannot wonder that the ancients were ſo curious in the degree of heat; or in the way in which it was to be applied; or in the ſhapes of their irons, which were conical, that they might

touch nothing but the point of the bleeding artery; nor in the choice of their metals, preferring ſuch as were ſuſceptible of only a moderate degree of heat: for if they heated their irons too little, they did nothing; there was no eſchar formed, and the bleeding was not ſtopped; if they burnt too much, the ſlough, though fully formed, fell off almoſt as ſoon as the iron was withdrawn. But let them burn ever ſo cautiouſly, the ſloughs were to fall off ſooner or later, and it made little difference whether they fell off on the firſt or on the ſecond dreſſing, on the fourth or on the eighth day; and as they were in continual fear of this, they never undid the wound, without having a tourniquet round the limb. At every dreſſing the patient was tormented with the irons, and at every ſucceeding dreſſing he loſt more blood, ſo that the laſt condition of that man was worſe than the firſt.

It was in thoſe times that the invention of a new cautery, or a new ſhape for the iron, was thought meritorious. It was then, alſo, that Fabricius ab Aquapendente, publiſhed his new method, as he calls it, of cutting out a cancerous breaſt: "For if it be a moveable cancer, I cut it away," ſays Aquapendente, "with a red hot knife, which ſears or burns as it cuts; but if it be a cancer adhering firmly to the thorax, I cut it, without either bleeding or pain, with a wooden or horn knife ſoaked in aquafortis, with which, having cut through the ſkin, I then do the reſt by digging out the gland with my fingers *." Theſe are methods

* Ego autem, etſi nil tale facere molitus ſum, ſi eſſem facturus, ut dolorem primo vitarem, et ſanici profuſionem, ſi cancer ſit mobilis, ip-

really deſerving of the encomium which Mr. Dionis put in the author's name. "They have chiefly the merit, ſays Dionis, of killing two birds with one ſtone." "On ferait d'une pierre deux coups *."

But it muſt not be forgotten that there are caſes where even this horrid method may yet need to be uſed, as in bleedings from the gums, cheeks, pallate, or tonſils, or other parts within the mouth.

2. The STYPTIC SOLUTIONS, powders and doſſils of various kinds, came next into uſe; for ſurgeons practiſing chiefly the actual cautery or hot iron, were naturally led next to think of the various ſubſtances, which are uſually called Potential Cauteries, and which are chiefly metallic or earthy ſalts, as ſilver cauſtic, vitriols, corroſive ſublimate, alum, or the mineral or vegetable acids; which are, when diluted, gentle ſtimulants, or as they are called, aſtringents; exciting contraction of the veſſels, and forming coagula upon the bleeding ſurface. Before ſurgeons came to uſe the needle freely, they often truſted to cauſtics; but in uſing buttons of vitriol, or little bags

ſum forcipe hoc apprehenſo ſtatim cultro, uno eodemque tempore candente et incidente opus peragerem, ut forcipe valide conſtrigente ſenſus partes hebetetur, cultro incidente amputetur cancer, et eodem candente ſanguis ſupprimatur. Quod ſi cancer mamillæ adherens et firmus ſit, neque ſtringi poſſit, excedendus omnino eſt, atque ad vitandum et dolorem et profuſionem, excederem cum ligno aut cornu, aciem habente intincto tamen ſubinde in aqua illa, qua aurifices ab argenteo aurum ſeparant, quam fortem vulgus nominat, quo tota cutis in circuita mammillæ incidenda eſt, poſtea digitis potiſſimum et unguibus mammillæ glandulоſa ſubſtantia à ſubjecta parte ſeparanda.

* Dionis, page 362.

of it in powder, applied to the end of each artery, they found that by this method alſo, the end of the artery was deſtroyed, as by the burning irons, and ſloughed off, and required the application of the tourniquet, every time that the dreſſings were undone, and at each dreſſing, the application alſo of new vitriols. Even after they came to uſe the needle freely, it ſeemed to be a harſh method, Surgeons were ſtill hoping to find ſome leſs painful one; which eaſy and credulous temper in men of our profeſſion, has given the tone to thoſe unacquainted with ſubjects like theſe, and has left the public ever credulous, open to the practices of quacks, and noſtrum-mongers. We have now tolerable ſpecimens of all that can be produced from the vegetable or mineral kingdom, to ſerve as ſtyptics, and find them good for nothing; we know that no acid, ſpirituous, nor ſaline body, ever acts as a ſtyptic, without cauſing pain; what then ſhould we expect from the random inventions of ignorant people, whoſe only trade is that of cheating the public, and whoſe only ſkill is that of contriving or managing the deceit? What have we, who can manage every thing by compreſſion, or with the needle, to do with ſtyptics? Or why ſhould we ſuffer this continual ſucceſſion of traſhy compoſitions, under the title of vulnerary balſams, ſtyptic ſolutions, ſtyptic powders and the like? Since, from the time of Rabell, down to the celebrated Ruſpini, we have found diſappointment come quick after each fit of anxiety and expectation; and ſince we have much reaſon to believe, that the beſt of theſe are little elſe than acids, ſpirits, turpentine, or trifling ſolutions of ſome aſtringent gum.

Rabell was a German chemiſt, and having come to Paris with his ſtyptic, he ſo wearied the king, and Mr. Louvais, with entreaties and ſolicitations, that after long attendance, he obtained leave to uſe it upon one of the ſoldiers in the Hoſpital of Invalids. This poor man's leg having been amputated in the uſual form, the ſurgeons and phyſicians of the hoſpital, delivered him up to Mr. Rabell, who had hardly finiſhed the firſt application of this ſtyptic, before the blood came draining through all the dreſſings. He doubled the doſe of his ſtyptic water, dreſſed his ſtump firmly a ſecond time, but ſtill the blood flowed *; ſo that in a little while, and in preſence of all the aſſiſtants, the unhappy ſubject of this cruel experiment, died under his hands; either they had not had that fear, which they ſhould have had for the patient's life, or they wanted humanity or reſolution enough to ſtop this horrid experiment; but they made ſome amends by procuring an order from the king, prohibiting Rabell, under the ſevereſt penalties, from repeating this attempt.

We have ſeen the lateſt of theſe inventions, Ruſpini's ſtyptic, tried in this place, where I believe it is eſteemed as of much the ſame value, withthe ſympathetic powder of that famous Knight and moſt complete Gentleman, Sir Kenelm Digby; which ſympathetic powder ſtaunched the blood, as effectually when it was applied to the weapon, as when applied to the wound itſelf †.

* This Eau de Rabell, ſo famous in France and Germany, was juſt a mixture of ſtrong ſpirit of vitriol, and ſpirits of wine.

† This I believe is the ſame Knight, whoſe gallantry and loyalty carried him to ſuch an exceſs, that he burſt the arteries of his legs, ſo

But here alſo it muſt be remembered, that though no ſtyptic, waſh, or powder, is to be put in competition with the needle, nor to be uſed in amputation, or in any great wound; ſtyptics muſt be uſeful in all internal hæmorrhages, as from the noſtrils, throat, alimentary canal, &c. or in any broad bleeding ſurface, where no particular artery be can ſeen.

3. The AGARIC of the OAK was firſt uſed about fifty years go. It is a fungus growing upon old oaks. It is gathered in Auguſt or September; is prepared by long keeping in a dry place, cutting away the outſide rind, beating it till it ſoften, ſo that it begins to yield, and can be torn with the fingers. It is of the colour and appearance of chamoy leather, but ſpongy and looſe; in the country parts of Ireland, it is actually called oak-leather. A piece of this fungus, put down and ſettled with a compreſs and bandage over the mouth of any wounded artery, does preciſely the office of a piece of a ſponge: And as for the

as to form aneuriſms, by kicking open the doors of the den in which the boar was confined, which the King was to hunt; but whether his aneuriſms needed to be opened, or whether he uſed his ſympathetic powder, or whether he applied it to the door, or to his own hams, the German writer who tells this ſtory, does not declare.

"Vidi equitem Digbeum, amicum intimum, egregium philoſophum, chimiſtam, cujus præſcripta medica curioſa typis mandata Pariſiis, a Treſelio mihi dicata fuere; exortæ illi fuere venæ et arteriæ variceformes in tibiis, cum pedum impulſu conaretur infringere fores ſepti ferarum, quibus Rex Angliæ adſtabat, quocum venatum ibat: Forte contigit in eo occurſu ut tunica arteriarum media crepuerit, ipſa autem arteria admodum dilatata; tunc temporis tumor longitudinem arteriæ inſequitur, in extenſione vim patientis."—Zodiac. Med. Gall. p. 45.

character of this particular remedy, I ſhould ſay, that had it been invented in the days of Celſus, when they were cutting off limbs, not with the aſſiſtance of the tourniquet, but by the gripe, (i. e. by aſſiſtants graſping the thigh), when they were ſearing the arteries with their burning irons, it muſt have been of infinite value, and muſt have ſaved many lives; but coming as it did in competition with the needle, it muſt have delayed the general uſe of the needle, and muſt no doubt, have endangered many lives, and was in no reſpect worthy of the high praiſes beſtowed upon it by the Academy of Surgery, nor of thoſe liberal rewards, which the King of France beſtowed upon Mr. Broſſard. The privilege of rewarding merit is no doubt a high one; but I fear that ſuch rewards, are rather a general bribe, for the concealing of uſeful inventions; while an invention really uſeful, will be in the ſame degree honourable; and in our profeſſion, moſt of all, every uſeful invention will reward itſelf.

4. The SPONGE, which has been uſed chiefly by the celebrated Mr. White, is more uſeful than the agaric; it is like it in its operation, is really of value in practice, not to take precedency of the needle, but to aſſiſt it. The ſponge can be very thoroughly dried, it can be compreſſed into a very ſmall compaſs, it can take any ſhape, and may be thruſt down into cavities and narrow wounds, where the needle cannot go, it can be made ſo hard, and preſſed ſo firm, by laying compreſſes over it, as to have at once the effect of a compreſs and of a ſponge; or rather of a compreſs having this cu-

rious property, that at firſt it preſſes moderately, but if one drop of blood eſcapes, that blood is abſorbed, ſo that the compreſs ſtill preſerves its contact with the bleeding artery, and ſwells and preſſes harder exactly in proportion as ſuch preſſure is required.—This plainly is the effect of a ſponge, whether it be nitched in betwixt two bones to compreſs an artery which the needle cannot reach, or whether it be laid flat upon an open ſore, as after cutting out the breaſt, or after an amputation done according to the old faſhion, where the ſurgeon uſed to dreſs his ſtump open, and to heap compreſſes tied with a firm bandage above each piece of agaric or ſponge. The agaric poſſeſſing a degree of this property is of uſe; even our common charpie poſſeſſes this quality of abſorbing and ſwelling in a ſlight degree. But the agaric and ſponge are both ſo excellent in this reſpect, that even thoſe who are the leaſt inclined to uſe them, muſt acknowledge, that though the agaric will often fail, it has yet enabled ſurgeons to perform the greater amputations, as of the thigh, ſafely, without uſing the ligature, as is excellently proved in the trials by Mr. Warner, at the deſire of the Royal Society, as well as by the inventor, aſſiſted by Meſſrs. Fagel, Bouquot, and Morrand, in France. And the ſponge, as is proved by Mr. White's practice, is the only thing that can ſtand by the ſide of the ligature to aſſiſt it. I am ſenſible, that by thruſting down a ſponge, I have ſaved a patient's life, when I am not ſure that I could have extricated myſelf by any nicer operation *.

* The chief Papers, upon this ſubject of the uſe of the fungi, of

This point, then, of the value of the agaric, bovista, puff-ball, (or by whatever other name various surgeons have known these fungi), and of the sponge itself, without further explanation, can be easily settled thus.—Had they been discovered in the times of the old surgery when cauteries were used, they must have saved many lives: But now when we know well how to use the needle, they cannot come at all in competition with that surer method. The thrusting down a sponge into any wound, is absolutely inconsistent with our common intention of immediately reuniting that wound; and the tying of arteries must, in amputations, in aneurisms, and in all simple wounds, be preferred, for two reasons, both as it is the surer method, and as the ligatures of the arteries hang out from one corner of the wound, and do not hinder us from reuniting or even from sewing it up.

The use of the sponge is plainly limited to the cases of difficulty or danger.—Of difficulty, as where we

puff-ball, agaric, fungus vinosus, (a fungus that grows in wine cellars), &c. may be seen in the Philosophical Transactions, or in the Academy of Sciences, about the year 1756; and there will also be seen, some indications of the confused notions they had about these fungi; considering them not merely as sponges, but as containing some hidden inexplicable virtue in restraining hæmorrhages: this is best understood by the experiments of one man, who resolving to be very wise,—or like a true SOCIETARIAN,—(as Dr. Hill would have said), BOILED IT!! "I have tried it, says this gentleman, in female cases, with *great success*, by injecting a STRONG DECOCTION of this fungus into the womb, in hæmorrhages from the womb, and especially in fluxes, after delivery." Vid. Philosophical Transactions, p. 265.—He had better have injected a STRONG DECOCTION of Album Græcum.

cannot ſee the bottom of a deep wound; where we cannot ſee the bleeding artery; where we dare not cut far down to the artery, on account of the nearneſs of ſome other great artery or important nerve; where we cut forwards with the knife, and would not willingly uſe the needle by making a plunge in the dark.—Or of danger, as when it happens, as it ſometimes does, that the needle has already failed; where the bleeding is from the head, or in the trunk of the body, and is not to be commanded by a tourniquet; where we do not mean to heal by adheſion, or where the danger from bleeding is ſo great, as to put out of the queſtion all trivial conſiderations about the quick healing of the wound;—where the bleeding is very furious at the bottom of ſome deep wound, filling it with blood, ſo as to hinder us from ſeeing the bleeding artery, and preventing us from uſing the needle, or, at leaſt, preventing us from uſing it deliberately or ſafely; or where the bleeding is from ſome general ſurface, and not from one particular artery which can be ſeen, and tied; or where, though the artery can be diſtinctly ſeen, it lies among putrid fleſh, and is itſelf ſo putrid, in a gangrenous and foul cavity, or on the ſurface of an unhealthy ſtump, that the needle either cannot be uſed, or will not keep its hold.———Theſe are the difficulties and dangers, which force us to retain the ſponge, though we prefer the ligature.

Laſt of all, the LIGATURE of the ARTERIES was invented by the celebrated Paræus, who was firſt ſurgeon to four ſucceſſive kings of France. His high fame

descending thus for ages, must make you desirous of knowing what was the real character of the man; and there is no one point upon which his character turns so much as this single invention: for of all the improvements of his practice, this of tying arteries was that of which he was the proudest, venturing to say, "For the good of mankind; and the improvement and honour of surgery, I, was inspired by God with this good thought." And as it was the highest of all his improvements, it was that for which his enemies envied him the most.

The fortune of Paræus was very singular; he was at once the chief surgeon, the counsellor, and the private and familiar friend of four sucessive kings of France. He attended them in their retirements and loofer hours, he followed them into the field, through all those dangers which were in those days part of the duties of a king; and which his writings display to us, with a faithfulness and minuteness of description which the historian should hardly disdain. He had the good fortune on one occasion to save manifestly the life of the king, when his arm had been so hurt in bleeding, that it was three months before Paræus could accomplish the cure. And this man was of such rare abilities, and so much valued by the king, that he alone was saved alive in that horrid massacre of St. Bartholomew's day, which remains an eternal blot upon the French name.

But of all his good fortune, this is the most remarkable, that it was he alone, who, by his influence over the king, put a stop to this unparalleled butchery,

after it had continued in all the quarters of Paris during two days—The feelings of the king after those dreadful days of carnage and moſt ſacrilegious murder, and the familiar and even tender manner of his complaining to Paræus, are told by the Duke de Sully very feelingly; for he was himſelf of the Reformed religion, and though yet a child with difficulty eſcaped.

* "The hour is now come, ſaid the king, when all France ſhall be of one religion." "Now, by God's light Sire, (replied Paræus), I think you will never forget your promiſe to me, that there were four things you would never force me to do:—To enter again into my mother's womb;—to go out in the day of battle;—to leave your ſervice;—or, to go to maſs.—The king then took him aſide, and opened up to him the troubles with which his ſoul was diſquieted.

* "Que ce Prince lui ayant dit le jour du maſſacre, qui c'etoit à cette heure, qu'il falloit que tout le monde ſe fit catholique. Parée lui repondit ſans s'etonner : Par la lumiere de Dieu, Sire, je crois qu'il vous ſouvient m'avoir promis de ne me commander jamais quatre choſes ; ſçavoir, de rentrer dans le ventre de ma mere, de me trouver a un jour de bataille, de quitter votre ſervice, et d'aller à la meſſe." Le Roi le prit a part, et s'ouvrit a lui ſur le trouble dont il ſe ſentoit agité. "Ambroiſe, lui dit-il, je ne ſçais ce qui m'eſt ſurvenu depuis deux ou trois jours ; mais je me trouve l'eſprit et le corps tout auſſi emus, que ſi j'avois la fievre. Il me ſemble a tout moment, auſſi bien veillant que dormant, que ces corps maſſacres ſe preſentent a moi, les faces hideuſes et convertes de ſang : je voudrois bien qu'on n'y eut pas compris les imbeciles et les innocens." L'Ordre qui fut publié le jour ſuivant de faire ceſſer la tuerie, fut le fruit de cette converſation. —Sully, Liv. I. p. 33.

——"Ambrofe, fays he, I know not how it is with me, but it goes fo heavily, that within thefe three days, I am as in a fever;—indeed I am ill, as ill in mind as in body; fleeping or waking, the murdered Hugenots are ever before my eyes, with hideous faces weltering in their blood.—Would to God the children and the aged, at leaft, had been fpared!" The order for ftopping the maffacre, which was proclaimed the following day, was the refult of this converfation.

There had long been an open war, about privileges and dignities, betwixt the furgeons and phyficians; and that was one caufe of fettled malignity and difcontent. That Paræus, a furgeon merely, fhould venture to write fo large a book on furgery, and fhould make it, according to the grotefque tafte of that age, a good and learned book, was high matter of jealoufy and offence, and for this reafon alone, was Paræus accufed of ignorance in the Latin language, and of hiring young phyficians, (as if young phyficians fhould be more capable in furgery, than old furgeons), to write his books. That Paræus's abilities fhould have raifed him to ftations of honour, or made him thus familiar with a race of princes not too apt to condefcend, muft have been a fore grievance to all his enemies, or which is the fame, to all the phyficians; but moft efpecially, to fuch a man, and fuch a phyfician as Gourmaline, whofe tafte in learning and in manners, and whofe habits of mind, are beft explained, by fhowing the kind of language, with which he affaulted Paræus.

" It was then very forward, rafh, and prefumptous,

in a certain perſon, to venture upon condemning the cauterizing of bleeding veſſels (after cutting off a mortified limb), a method ſo highly and continually commended and approved of by all the ancients; teaching in oppoſition to that, without any authority, without knowledge, without experience, without good ſenſe, ſome new method of his own, of tying arteries and veins." And in the end, he proceeds to call him carnifex, and other names, which it is needleſs to repeat *.

Paræus, familiar as he was with Kings and Princes, was not to obſerve the very ſtricteſt rules, with an antagoniſt like Mr. Gourmaline; but in the anſwer which he made to this heavy charge, we perceive, through his ſharp reproof of Mr. Gourmaline, mixed as it is with indelicacies, which the faſhion of the time gave countenance to, the natural good ſenſe, and the right education of Paræus, and the true grounds on which his character was founded; which laſt he explains to us with a confidence and ſteadineſs, well becoming ſuch a man †.

* Male igitur et nimium arroganter, inconſultus et temerarius quidam vaſorum uſtionem poſt mortui membri reſectionem, a veteribus omnibus plurimum commendatam et ſemper probatam, damnare auſus eſt: novum quendam deligandi vaſa modum contra veteres omnes medicos ſine ratione, experientia, et judicio, docere cupiens, nec animadvertit majora multo pericula ex ipſa vaſorum deligatione (quam acu partem ſanam profunde transfigendo, adminiſtrari vult) imminere, quam ex ipſa uſtione.

† Davantage vous dites, que vous me monſtrerez ma leçon aux operations de chirurgie; il me ſemble que ne ſçuariez, parceque je ne l'ay pas appriſe ſeulement en mon eſtude; et par avoir ouy par pluſieurs

"You boaſt moreover, Mr. Gourmaline, that you will teach me my leſſons in ſurgery, and my operations; but in that I believe, you are a little miſtaken; for my education has been quite after another faſhion. I have learnt my art, not in my cloſet; no, nor by hearing the diſcourſes of phyſicians, though that alſo, I have not deſpiſed; but in the Hotel Dieu, where I lived for three years, ſeeing many diſeaſes, and learning many operations upon the living body: and learning alſo much of the anatomy upon the dead; and of this I truſt I have given ſufficient proofs in the public ſchools."——"But I have yet more to boaſt of; for, being called into the ſervice of the kings of France, I have in my time, ſerved four ſucceſſive kings, and I have followed them in battles, and in ſkirmiſhes, and aſſaults; ſometimes alſo blocked up with the beſieged, curing their wounds."—"And laſt of all, I have lived in this great and famous city of Paris, many long years, where, thank God, I have been held in ſome repute, and ranked at leaſt equal with my peers; in ſo much, that there have been few difficult, or famous cures, in which my head and hand have not been employed.—How! ſeeing theſe things, dares ſuch a man as

et diverſes années les leçons des docteurs en medecine: mais comme j'ay eſcrit cy-devant en l'epiſtre au lecteur, j'ay fait reſidance en l'Hoſtel Dieu de Paris par l'eſpace de trois ans, ou j'ay eu moyen de voir et apprendre beaucoup d'œuvres de chirurgie, ſur une infinité de malades, enſemble l'anatomie ſur une grande quantité de corps morts, ainſi que ſouvent j'en ay fait preuve tres ſuffiſante publiquement aux eſcoles de medecine de Paris, &c.

you, who have made ſurgery no part of your ſtudy, talk of teaching me * ?"

* It may not be amiſs, to inſert the following quotation, as a ſpecimen, of the manner and language of thoſe times, and I am directed to this paſſage, by a good mark, the Marginal Index; where I find the following ſharp taunt, entitled by Paræus, " Belle Similitude." P. 781.

" You remind me, Mr. Gourmaline, of a little ſcrubby boy, who had come from lower Brittany to Paris forſooth to learn French; and one day the organiſt of the great church of Notre Dame, found him lounging about one of the gates of the Palace, and took him to blow the organ. After three years, this little round fat-arſed fellow, (bien feſſu et materiel,) finding that he had learned not one word of French, returned to his father: telling him that now he could ſpeak good French, " and beſides Vather, ſays he, I can play upon the organs," (et lui dit quil parla bonne Français et davantage qu'il ſcavoit bien jouer des orgues). The father quite delighted with ſuch a ſon, goes ſtraightway to the organiſt of their great church, " Do, ſays the father, let my ſon try the organ; for I long to know whether he be ſuch a proficient as he ſays he is." The organiſt very obligingly went along with them, and the boy having got into the organ, preſently claps himſelf down by the bellows, with a ſort of inſtinctive jump. " Why, what's this ſays the organiſt with great ſimplicity ?"—" O nothing, ſays the boy, only you had beſt play upon the organ, for I play beſt upon the bellows." " Now I tell you, Mr. Gourmaline, that you have been all this while playing upon the bellows, while I have been playing upon the keys; it is a vaſtly eaſy matter, for a fellow like you to heeze upon his chair and prattle about it; but performing ſurgical operations with the knife in hand, is quite another affair." P. 781.

Partant, il eſt à croire, que n'avez jamais ſorty de voſtre eſtude, que pour enſeigner la theorique (ſi vous l'avez pû faire) les operations de chirurgie s'apprennent a l'œil et au toucher. Je diray que vous reſemblez à un jeune garçon Bas Breton, *bien feſſu et materiel*, qui demanda congé a ſon pere pour venir à Paris prendre France. Eſtant arrivé,

You may ſee by this introduction, (for this is the introduction to the book, which he calls his Apology, and his Voyages), that he prepares to defend his invention of the tying of arteries, with true ſpirit. He both defends it practically, and he alſo defends it learnedly; for he was required to prove, that the principles, at leaſt, if not the abſolute practice of this operation was to be found in the writings of the ancients; but after all his ſearehing among the works of Galen, Celſus, Avicenna, and the reſt, we find him happily unable to produce any ſuch authorities, as might hurt his own claim to the diſcovery, or benefit his cauſe.

But he proceeds next, in a ſtyle more natural to him, to prove it by facts; by his amputations, and other operations, and by his doings in other dangerous wounds, atteſted by his aſſiſtant ſurgeons, men of the

l'organiſte de Notre Dame le trouva à la porte du palais, qui le print pour ſouffler aux orgues, ou il fut trois ans. Il vid qu'il parloit ancunement François, il s'en retourne vers ſon pere, et luy dit, *qu'il parloit bonne France, et davautage, qu'il ſcavoit bien jouer des orgues.* Le pere le recent bien joyeux dequoy il eſtoit en ſi peu de temps ſi ſçavant; il s'en alla vers l'organiſte de leur grande egliſe, et le pria de permettre à ſon fils de jouer des orgues, a fin de ſçavoir ſi ſon fils eſtoit bon maiſtre ainſi qu'il diſoit; ce que le maiſtre organiſte accorda voluntiers. Eſtant entré aux orgues, il ſe jette de plein ſaute aux ſufflets, le maiſtre organiſte lui dit, qu'il jouait, et que luy ſouffleroit; alors ce bon maiſtre reſpond, *qu'il jouait luy meſme des orgues s'il vouloit; car quand a luy il ne pouvoit jouer que des ſoufflets.* Je croy auſſi; mon petit maiſtre, que vous ne ſçavez autre choſe que caqueter en une chaire; mais moi je joueray ſur le clavier et ferai reſonner les orgues; c'eſt a dire, que je ferai les operations de chirurgie, ce que ne ſçauriez nullement faire pour n'avoir bougé de voſtre eſtude et des eſcholes, comme j'ay dit.

highest name, and especially by Guillimeau, who then lived in the house with him, as a pupil, and who acquired in the end, a character worthy of his breeding: But what most of all delights me, is to observe, how perfect the system of Paræus's practice was, in respect of hæmorrhages and the securing of arteries.

"If there be a bleeding artery, says Paræus in any wound, dress the wound with astringents; but be careful at the same time, to lay a firm compress over the wound, and settle it well with a bandage, and then lay out the wounded limb, in an easy way."

"If this do not serve, clap your finger upon the point of the artery, and wait patiently till a clot be formed."

"If the artery still bleeds, cut up the wound, if it have been sewed, and pass a needle under the artery, taking up with it in the ligature, much or little flesh, according to the circumstances of the case."

"If the artery have shrunk up among the flesh, cut up the wound above the artery, and tie it."

"But should both ends of the artery have been still further retracted, then continue your incision, and cut open the skin freely, still pursuing the artery; but still careful of the very artery that you are pursuing, lest you should cut it a second time."

"In an amputated stump, draw your arteries out with the forceps, tie them neatly with a thread; but if once you miss the artery, or your first thread give way, do not use the forceps any more; but pass a needle four inches long into the stump, so as to tie in the artery, along with much of the flesh."

This is a ſyſtem of inſtructions, which is fairly extracted from Paræus's books, without mending the text, and though this ſyſtem be now one hundred and fifty years old, it is ſuch as I believe, the beſt ſurgeon at this day in Europe could hardly improve; for in correctneſs of practice, ſurgeons from his time, went backwards for many ages, (at leaſt, in this point); nor did they argue, becauſe their judgment was not convinced; but, on the contrary, it was by arguing upon a plain point, that they unſettled their judgments; for, from the moment that they began to argue, this part of practice ceaſed to improve; monſtrous fancies haunted their imaginations, which ſome were glad to turn into arguments againſt a new practice; while others were really afraid. Firſt, They were afraid, leſt the ligature ſhould give way, and they ſaid it would cut acroſs the artery; it would make the end of the artery mortify; it might be thrown off by the continual beating of the artery, ſo they ſtitched it up and croſs-tied and knotted it, and took all kinds of ſecurity. They not only tied one ligature round the artery, but they at the ſame time transfixed it with a needle, and then twiſted together the knots. Then like children, afraid of what they had done, they feared leſt this firm tying of the artery, ſhould occaſion locked jaw, or univerſal convulſions; ſo that on their amputation table, was produced nothing ſmaller than tapes, and their needles, which were three or four inches long, were carried round each artery, at the diſtance of an inch. It is only after much experience, and by very ſlow degrees, that we have

learnt at laſt, that the drawing out an artery with the forceps or tenaculum, and the tying it clean with a ſmall ligature, the method which appeared to the older ſurgeons to have every fault, is abſolutely the moſt ſecure *.

RULES

FOR STOPPING THE HÆMORRAAGY FROM ALL SMALLER ARTERIES.

1. STYPTICS can avail us very little in any dangerous hæmorrhagy, and they ſtand in our liſt, chiefly becauſe they were valued by the older ſurgeons, who, though they uſed the needle, never could rid themſelves of all their prejudices, and uſe it freely. With us ſtyptics are of little value, ſo that we never think of uſing them, except in bleedings from arteries of the very ſmalleſt ſize; where the hæmorrhage is of ſo little danger, that we would not trouble our patient with the ſharp pain, which the needle cauſes; we do not uſe them where we ſee the bleeding artery, or

* There is a defect in the common ligature, made with the needle, which has not been ſufficiently obſerved; for not only is there always much fleſh included along with the artery, which fades, ſo that the artery is again free; but the ligature paſſed with the needle, does not go round the artery in a circle, but up on one ſide, and down on the other, in a ſcolloped form, which gives a double effect, to this unavoidable fading of the parts; but yet this is a trifle to the general queſtion.

where we can uſe the ligature, or the compreſs; we find them uſeful, chiefly in oozings of blood from hollow paſſages, as in bleedings from the noſtrils, the gums, the throat, the womb, the alimentary canal, or in bleedings from foul ulcers, from the cavities of deep ſores, or from any broad and diſeaſed ſurfaces, where the bloody exudation may be checked, and the condition of the ſurface mended at once, by the ſtimulant nature of our ſtyptics. The beſt of which are diluted vinegar, or ſpirits, or mineral acids, or ſolutions of alum.

2. There are alſo caſes, where we ſhould chooſe to diſregard the bleeding from the ſmaller arteries; even though they be of ſuch ſize, as to be ſeen throwing out their blood by jets; we perform few operations, in which we do not ſee little arteries throwing out their blood, which before we have finiſhed our inciſions, have ſhrunk; and have injected the cellular ſubſtance round about them, ſo that it is thickened, and their mouths are cloſed. Such arteries are no more heard of, and the cure goes on well. And, in like manner, we often ſee little arteries opened, in wounds which we diſregard altogether, we allow them to exhauſt themſelves; keep the wound expoſed to the air; and when the bleeding and general oozing relents a little, we clean the wound; or we at leaſt take away the groſſer clots of blood, which might prevent the reunion of the wound. Then we lay the lips of the wound together; and then we lay our compreſſes in ſuch a manner, as to preſs the lips of the wound to each other, and to preſs the cut ſurface of the wound

to the bottom of the wound; ſo that theſe compreſſes, which thus procure the adheſion of the wounded ſurfaces, prevent, at the ſame time, any further bleeding within. The bandages of ſuch a wound ſhould be painfully tight at firſt, and may be ſlackened in a few hours.

3. In all hæmorrhages, where we have a full and rather dangerous bleeding, and in which we ſee diſtinctly one or two great arteries or veins throwing out blood, the bleeding muſt be ſuppreſſed either by the ligature, or by a ſteady compreſs, and the ligature, wherever we can uſe it eaſily, ought to be preferred.

4. If an artery of a ſmaller order, and lying firm againſt ſome bone, as in the hand, or foot, or temple, be cut; or, if either by ſtabs, a ſmall aneuriſm be formed, as in the wriſt, or at the root of the thumb; or if by a blow, the artery be hurt againſt the bone, and burſts, ſo that a ſmall beating aneuriſm enſues; in ſuch caſes we do not always go regularly to work, nor do we chooſe to give the patient the pain of opening ſuch a tumor; but ſometimes by departing from the general principle, we manage the particular caſe more eaſily, by applying a compreſs, which, being tied down hard and firm for two or three days, obliterates the artery, by flattening it againſt the bone. The blood of ſuch a trivial aneuriſm is as eaſily abſorbed, as that bloody tumor is, which we ſee ſo often on the heads of children immediately after birth. It is juſt by ſuch a compreſs, that we ſtop the Temporal Artery, after opening it with the lancet.

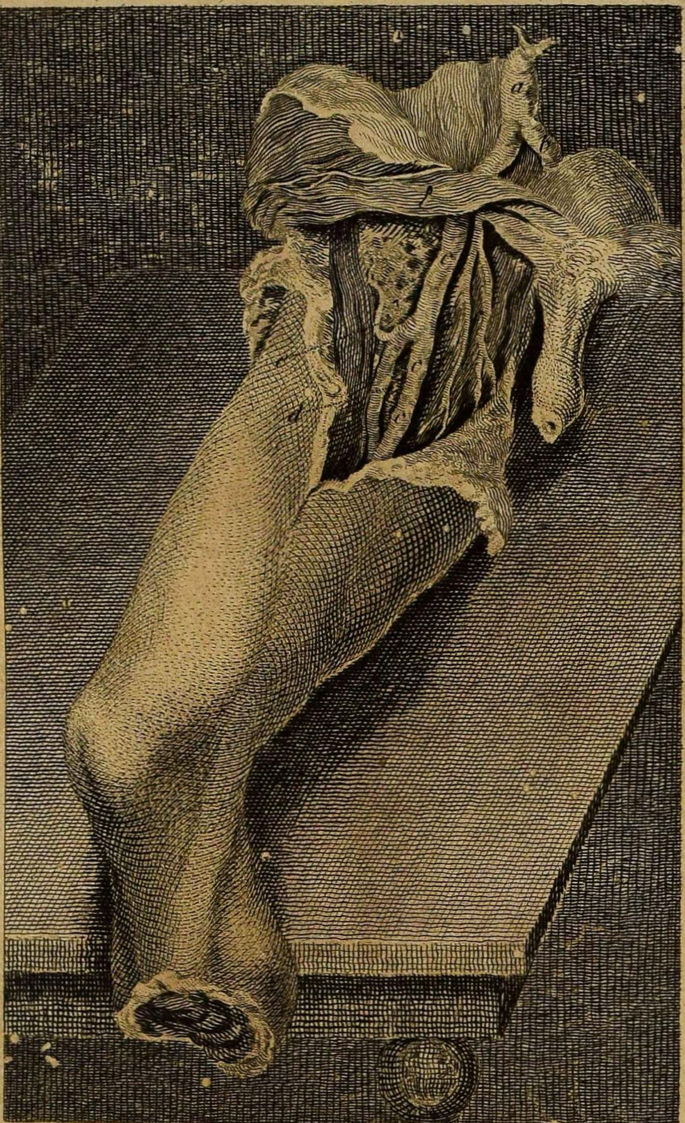
5. The manner of making compreſſion to obliterate an artery, muſt vary according to the circumſtances of the caſe: Sometimes, as in aneuriſms, it ſhould be made above the ſkin, and on that part of the artery, where it is juſt entering into ſome ſmall aneuriſmal bag, and the artery which feeds the aneuriſm being thus obliterated, the blood already extravaſated will be abſorbed, and the little tumor itſelf will quite diſappear, leaving but a little thickening, or perhaps none. Sometimes, as in wounds, we make the compreſſion within the wound, cleaning it, looking for the place where the artery is, and perhaps there can be no better nor firmer compreſs, than a ſmall pellet of chewed paper, a piece of cork, a piece of folded leather, a piece of firm ſponge or agaric, a firm compreſs of folded linen; any thing will do for a compreſs, if it be but firm in itſelf, and neatly applied. The compreſs interrupts the cure by adheſion but for a few days: for when it is withdrawn on the ſecond or third day, the parts may then be laid down ſo as to adhere.

6. But the arteries of the wriſt, the palm of the hand, the fore part of the foot, &c. are of ſo great a ſize, that though when bruiſed, or hurt, or ſtabbed, and the ſkin healed over the hurt artery, the aneuriſm is commonly of a trifling ſize, and eaſily cured; yet theſe arteries being cut by working tools, a carving knife, &c. in the wriſt or the foot of a large and ſtrong man, there enſues a ſcene of terrible confuſion and perplexity; which perplexity, is itſelf the chief cauſe of ſuch loſs of blood, as often injures the con-

ſtitution, when it does not endanger the life: for the friends gather up napkins and cloths confuſedly, wrap them looſely and in a hurried way round the limb, and each cloth, as ſoon as it is ſoaked in blood, they remove, as if they had no other intention than the childiſh one of hiding from the patient what quantities of blood he is loſing; while, if in place of this general preſſure of cloths wrapped round the limb, they could have but the boldneſs to look upon the bleeding wound, and preſs upon the very point where the artery were bleeding, they might with one finger only ſuppreſs it, and with a ſingle touch. Then, let the recollection of this be a leſſon to the ſurgeon, and let the very ſight of this confuſion put him in mind of his duty, which is to whirl off thoſe confuſed bloody cloths as quickly as poſſible, and preſs the point of his thumb or finger directly upon the bleeding veſſel.

7. The bleeding being thus reſtrained, let the ſurgeon clean the limb, appoint his aſſiſtants, lay the hand upon a table and pillow; or if it be the leg, lay it out firm upon a ſtool. If he have no good aſſiſtants, let him make a temporary tourniquet with a common garter, and any ſtick; but if he have any profeſſional man to help him, then he ſhould ſtill prefer the ſuppreſſing of the bleeding with the point of his finger, becauſe in a moment he can let go the artery with one jet,—can cloſe it again as ſuddenly; in ſhort, he can let go the bleeding artery more quickly, and can ſee it oftener and with leſs loſs of blood than in uſing the tourniquet. Having thus fixed his eye upon the bleeding artery, he either draws it out with the hook

PLATE I.



J. Bell delin.t

J. Beugo sculp.t

a. The Arteria Iliaca Communis.

b. The Arteria Hypogastrica in the Pelvis.

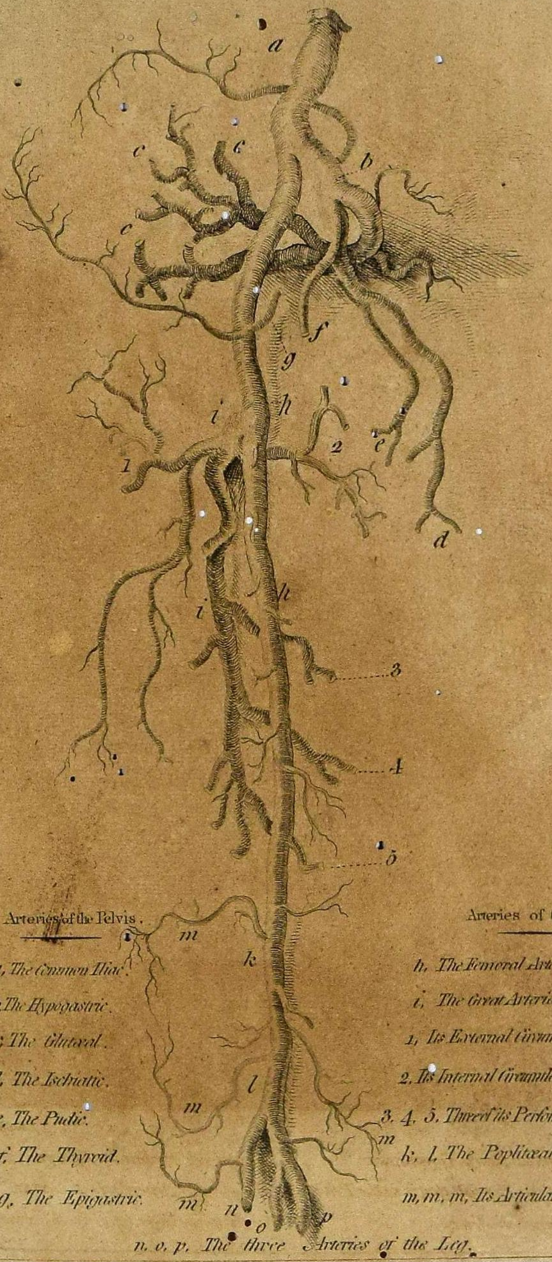
c. The Femoral Artery.

d. The Arteria Profunda Femoris.

e. The Arteria Articularis Externa.

f. The Cutaneous Veins lying by the Artery.

PLATE II.



Arteries of the Pelvis.

a, The Common Iliac.
b, The Hypogastric.
c, c, The Glutæal.
d, The Ischiatic.
e, The Pudic.
f, The Thyroid.
g, The Epigastric.

Arteries of the Thigh.

h, The Femoral Artery.
i, The Great Arteria Profunda.
1, Its External Circumflex Artery.
2, Its Internal Circumflex Artery.
3. 4. 5. Three of its Perforatg. Arteries.
k, l, The Popliteal Artery.
m, m, m, Its Articular Arteries.

n. o. p. The three Arteries of the Leg.

J. Bell delt. et sculpt.

or forceps, or he ſtrikes his ligature under it with the needle; or if neither of theſe can be done, then he puts either a regular tourniquet, or this occaſional tourniquet round the arm, and cuts up the wound freely, till he ſees the artery bleeding with open mouth.

8. Whatever blood the patient loſes before a ſurgeon arrives, is part of the natural danger of his wound; but it is a great diſhonour to the ſurgeon, if he loſe much blood after he arrives. Succeſſive bleedings, ſucceſſive divings with the needle, the taking in of arteries, tendons, and nerves, all in one great ligature, and hæmorrhages ſtill ſucceeding to theſe clumſy operations, are far from being honourable for the ſurgeon, eſpecially ſince theſe wounds of the fore arm, or leg, or hand, or foot, are in parts where we may uſe greater freedom. The ſurgeon, then, ſhould do his operations boldly; he ſhould not be ſparing in his firſt inciſions, (if he have but knowledge enough of the croſs ligaments, tendons, and nerves, to make ſuch inciſions ſafely): for if once he ſuffer this wounded artery to aſſume an aneuriſmal form; if he oppoſe the blood by ſlight compreſſes, ſuffering it all the while to bleed within; the artery will ſhrink, the cellular ſubſtance be crammed with blood, and the ſkin be thickened by inflammation alſo; the ſeeking out of the artery among ſuch a confuſion of parts, will be inconceivably difficult: both becauſe the artery does not bleed ſo as to direct us, and becauſe it lies deep, and becauſe the ſurgeon cuts very timorouſly; for even a bold man will be apprehenſive when he finds himſelf cutting through

parts which he does not underftand. And, in this particular cafe, the parts are fo maffed together, that he can diftinguifh no one part from another, unlefs he prolong his cut either above or below the place in which the blood is extravafated where the arteries are free; in fhort, as he cuts through two inches of confufed fubftance, and on fo naked a part as the wrift, (*e. g.*) he hardly doubts that he is cutting through mufcles and every thing, while in fact he is cutting only through the fkin, thickened to this degree by inflammation that has lafted for two or three days, and by the continual driving of the blood.

The rule which arifes out of this reprefentation of the cafe is very plain, *viz.* not to be fparing in the firft incifion; to do this firft and great point of the operation decidedly and boldly. The leaving no doubt about the tying of the artery, and no poffible occafion for future incifions, is in the end the greateft faving of pain; the firft operation is eafier than the fecond, and the fecond operation is eafier than the third. It is owing to this lenient practice of making a fmall incifion at firft that any fecond operation is ever required: It is owing to a want of ftill greater boldnefs in the fecond operation, that a third is ever required; and we know too well, how often a want of fuccefs in the third or fourth operation has tempted the furgeon to cut off the limb.

9. The fponge is often more ufeful than the needle, and often too in cafes of the greateft danger. Whereever the wounded artery lies deep, and we cannot cut for it, on account of the nearnefs of fome great artery or important nerve, as for example, about the neck or

about the angle of the jaw; wherever the bleeding artery is so nitched in betwixt two bones that we cannot draw it out with the tenaculum, nor reach it with our crooked needles, as for example, in the fore arm, or betwixt the bones of the leg: In short, wherever we cannot see the artery, or cannot strike it, (or strike at it safely) with the needle; wherever the bleeding is not so much from a particular artery as from a general surface; or wherever the blood is thought to flow rather from great veins than from arteries, (as in tearing out cancerous glands from the armpit,) in all such cases we use the sponge, and we use it in the following manner.—We keep the sponge dry and hard compressed; cut it into small pieces, square or long, as the incision requires; tie small threads to them, by which they may be drawn away in due time; we choose out one piece, thrust it down to the bottom of the wound, settle it there with the point of the finger, either expressly upon the mouth of the bleeding artery, or if that cannot be distinctly seen, upon the place at which the artery bleeds; then lay one compress above the sponge, a second compress above the first, a third above the second; and taking care to keep the compresses always steady with one finger, we pile one above the other, till the whole rises so, above the level of the wound, that our bandage operates well upon the whole of this, which is called the graduated compress.

I advise you, on such occasions, to keep your tourniquet screwed during the whole operation, that you may not be troubled with blood; to slacken it slowly,

that the dreſſings may not be diſcompoſed by the too ſudden return of blood; and ſtill to let your tourniquet remain looſe about the limb, and ready to be ſcrewed if the artery ſhould bleed again.

OF OBLIQUE WOUNDS WHERE IT IS DIFFICULT TO FIND THE ARTERY.

But theſe rules belong, ſtrictly, to clean and open wounds, while there are often oblique wounds of the ſmaller arteries, which are attended with peculiar difficulty and danger. It is an oblique wound only, that can produce any form of aneuriſm in the fore arm or leg; for in every wound of the wriſt, the artery lies too ſuperficially, and too open to create any real difficulty with a dexterous ſurgeon; but in an oblique wound of the arm, or fore arm for example, the blood does not eſcape freely, the arm is filled with blood, the fleſh is ſoon corrupted, and the bone ſpoils; the diſeaſe, if allowed to go on thus, is a dangerous one, and the operation, though begun even upon the very firſt day, is very difficult, for the artery is never found with eaſe.

In this matter, then, there are two things chiefly to be explained, viz. the difficulty of finding the artery, and the terrible conſequences of the diſeaſe.

This difficulty of finding the artery is greater than it will be eaſy for you to conceive; and I ſhall ſpeak more fully upon this ſubject, that I may be able both

to explain to you the difficulties, and, at the ſame time to convince you of the natural dangers of ſuch a caſe; and eſpecially, that I may impreſs ſtrongly upon your minds the ſtill greater dangers of ignorance, or timidity; of this cruel lenity, (for it is called lenity) and of the folly of making inciſions too ſmall for the occaſion, which, notwithſtanding, are ſuch as to produce all the pain of the greateſt inciſion, yet at once protracting the operation, and making it imperfect. What caſe is more dangerous, or what operation more important than this of a wounded artery? and where is the other great operation, in which our firſt inciſions are done in this timorous way? I ſhould much rather, I am ſure, cut up the axilla, to get at a wounded artery, than cut through the perineum and bladder, to extract a ſtone. The one indeed is the more terrible diſeaſe, but the other, as you will ſee by the following example, is a buſineſs of immediate life or death.

But yet before I enter upon the deſcription of a caſe which I mean to ſtate to you, I feel the neceſſity of explaining what I think is the import of the caſe; and in a few words, the buſineſs is this:— Sometimes, an artery being ſtruck with the point of a knife or ſword, is merely punctured, and not cut acroſs. The obliquity of ſuch a wound, acts like a valve upon the artery, there is but little blood poured out under the ſkin, and no remarkable tumor is formed: Now, the ſurgeon ſatisfied from the ſudden and violent guſh of blood, that an artery is opened, feels himſelf called upon to look for the bleeding veſ-

ſel, and to cut up the arm or thigh; but preſuming too far upon his own knowledge of the arteries, he makes a new inciſion along the courſe of the artery, neglecting the more eaſy and natural way of ſeeking for the wound in the artery, by enlarging the natural wound: And when, for example, the artery is wounded from the outſide, he ventures to ſeek for it by a new inciſion from within. Thus he gets to that ſide of the artery, where no wound is; his attempts to make it bleed, only preſs the ſlit-like wound in the artery, down againſt the fleſh below, ſo that he cannot ſee the wound, nor even believe that there is one; he tries to make it bleed, but he fails; ſtill, he ſees the main trunk of the artery lying in the bottom of the wound, beating ſtrongly under his finger, apparently entire, and ſtill he cannot believe that there is any wound in it; he continues his work, but he can by no contrivance force it to bleed; he can never ſee where the wound in the great trunk is, nor be ſatisfied whether or not the blood flows from ſome ſmaller artery; but ſtill in his abſence it burſts out furiouſly, and bleeds ſo from time to time, till the patient expires. If I can ſhow you one ſuch caſe, it will be at once a leſſon and warning to you; and the warning will be juſt the more impreſſive, in proportion to the high name of the ſurgeon, who may have been guilty of ſuch a miſtake.

A young man of twenty-five years of age, in parrying a blow aimed, with a ſharp pointed knife, at his breaſt, received it in the middle of his arm. The knife, in that poſition of the arm, entered at the outer

edge of the biceps, and touched the Brachial Artery; he ſtaggered forwards a few paces, and then, fainting with the loſs of blood, fell down. Unfortunately there was no one preſent but a young pupil in ſurgery, ſo ignorant that he bled him, and tied up the arm, putting merely a compreſs upon the wound.

Till the eighth day, there was no farther alarm, when a very ſlight cough brought on a violent bleeding, and then fortunately, a ſurgeon was called, who really underſtood the dangerous nature of the caſe, and he, in his turn, called Mr. Duſchamps, upon whom the care of the patient now devolved; he found the arm enormouſly ſwelled, from the armpit to the elbow, and covered with echymoſis down to the wriſt.

"At nine in the morning, ſays Mr. Duſchamps, I began the operation, the patient being ſeated, and every thing prepared. But, behold, when I introduced my probe into the wound, it paſſed ſo far upwards towards the axilla, that I feared the wound was very high, perhaps in the Axillary Artery itſelf; ſo that inſtead of the operation for aneuriſm, I might find myſelf obliged to amputate at the ſhoulder joint. I begged to have another ſurgeon joined in conſultation, and accordingly Mr. Sabbattier met me in the evening at five o'clock. The operation was performed in the following manner."

Mr. Duſchamps made an inciſion, not by enlarging the natural wound, but by a new cut along the inſide of the arm, in the track of the humeral artery, full ſix inches long, extending downwards from the tendon of the pectoral muſcle along the arm; and by this inciſion,

he penetrated into the ancurifmal bag, and cleaned it thoroughly of coagulated blood. Mr. Dufchamps and his affiftants then fufpending the compreffion under the clavicle, hoped to fee the wound, or at leaft to be directed to it by the bleeding; but though they examined and wrought a full quarter of an hour, and although they faw and felt the main trunk of the artery beating under their fingers, they could not by any endeavours, make it difcharge one drop of blood; fo that one of them ventured to fay, he thought it could not be the main artery that was wounded; while others agreed that nothing but a wound of the main artery could account for the firft violent hæmorrhagy.

In this ftate of uncertainty, it was refolved to lay an occafional ligature under the artery, which if neceffary at any time, might be ufed, while the artery itfelf fhould be fubdued, by compreffion alone with agaric, and dry lint*. Mr. Dufchamps, firft enlarged a little

* He is confufed to the laft degree in his account of the cafe, fo that one cannot guefs, whether he did or did not ftrike this occafional ligature through the fkin and flefh, as the older furgeons did; as Mr. O'Halleran was accuftomed to do on difficult occafions, or as Mr. White did lately in Captain Mounfey's cafe; but what makes one fufpect that he did fo is this, that he makes the following contraft of the two parts of his operation: We refolved, fays Mr. Dufchamps, to ufe on the *infide* of the *wound*, a compreffion extending along the courfe of the artery; but beforehand, to put in an occafional ligature, "Dans cette incertitude, nous refolumes d'employer dans l'interieur de la plaie une compreffion fur le trajet de l'artere, et prealablement de placer une ligature d'attente." And next, he fays, "I paffed this ligature half an inch above the place, which the point of my finger reached to within the wound;" by which it is plain, that he was paffing this ligature either through the fkin, or through the wound he

the wound of the knife, and introduced his finger into it, puſhed his finger upwards towards the axilla; and by this diſſection, was enabled to apply his occaſional ligature half an inch higher than the point of his finger.

Secondly, He covered all the courſe of the artery, within the wound, with agaric and charpie, ſecured by an eighteen tailed bandage; but ſo ſlightly bound, that it did not ſuppreſs the pulſe.

At four in the morning the blood burſt out, but it ſtopped again of its own accord; it burſt out twice the next day, and in like manner ſtopped again. On the third day it burſt out yet again; but the hæmorrhage which came on upon the fourth morning was frightful indeed: The bed was ſoaked through and through with blood, which, from the foulneſs of the dreſſings, had contracted a terrible ſmell. At ten in the morning, ſays Mr. Duſchamps, I reached my patient, and undid the bandages. The agaric and charpie were left in the inciſions made with the ſcalpel; the charpie was drawn out of the firſt wound which was made with the knife; there was ſtill no bleeding, and the patient was dreſſed as before.—Again at mid-day the blood burſt out with amazing force, and again it was ſtopped by the attending pupil. Mr. Duſchamps now undid the

had made on the inſide of the arm, and not the wound made with the knife, which he had now dilated no further than to admit his finger, and he introduced his finger for no other purpoſe, than to ſerve as a directory. "Je pris le parti de choiſir ce lieu pour celui de la ligature, que je fis cinq à ſix lignes au deſſus de l'endroit ou repondoit l'extremité de mon doigt."

dreffings entirely; cleaned the wound; hoping to fee the wound in the artery, or, at leaft the jet of blood, but not one drop flowed.—" With a patient fo exhaufted," fays Mr. Dufchamps, " I durft no longer truft to compreffion; I now refolved to draw the occafional ligature, and the inftant that it was drawn, the blood was thrown out with force, proving very plainly that this ligature was below the place of the wound. I applied inftantly a fecond ligature above the firft, the blood was immediately ftopped, and as immediately did the patient lofe every degree of heat and of feeling in the limb." At this laft operation of Mr. Dufchamps, his patient had loft about three porringers of blood; half an hour after he fainted; in a few minutes he revived a little, but a thunder ftorm paffing over them at that critical moment with fome loud peals of thunder, affected him fo much, that on the third hour after the operation he expired.

" Upon opening the body," fays Dufchamps, " we found the Brachial Artery wounded from the outfide and from behind; the wound was above the giving off of the Profunda Humeri; fmall, punctured, made with the point of the knife juft under the border of the great Pectoral Mufcle; the occafional ligature furrounded the artery immediately below the wound, and that ligature which had fuppreffed the bleeding was half an inch above."

Thefe are all the circumftances of the cafe faithfully tranflated: But the manifold miftakes, though fome of them are fufficiently obvious, are yet upon the whole fo complicated one with another, and are at the fame

time, ſo important, that I muſt force myſelf to explain them to you.

Was is not a weakneſs, to ſuppoſe this ſame Arteria Profunda to be abſolutely eſſential in the preſerving of the limb? And yet this is an opinion which Mr. Duſchamps declares in the moſt unequivocal terms. "Certain other means might perhaps have aſſiſted me in ſecuring the artery in this caſe; although after all," ſays Mr. Duſchamps, "the wound of the artery being above the going off of the Profunda, it was in vain to think of ſaving the arm; but ſtill if ſuch means had but ſecured the artery and ſaved the patient's ſtrength entire, we ſhould have had in reſerve the amputation at the ſhoulder as the laſt reſource *."

Was it not as great a weakneſs to think of ſucceeding by compreſſes, without the compreſſion's being ſufficiently firm to obliterate the artery? Mr. Duſchamps applied his compreſs and bandages ſo ſlackly, that they never affected the pulſe; but had he conceived the true notion of obliterating the artery, and bound his compreſſes ſo as to have ſuppreſſed the pulſe, the artery muſt inſtantly have been forced to bleed, and he would thus have diſcovered at his firſt dreſſing what he diſcovered too late, and only when he drew the occaſional ligature, I mean the place of the wound.

Was it not a conceited and forward thing to truſt

* "Ce procédé m'auroit été de la plus grande utilité dans la première obſervation. La bleſſure de l'artére, à la vérité, etoit au deſſus des artères profondes ſupérieurs, et par conſéquent trop haute pour eſpérer de conſerver le bras; mais le malade alors n'étant pas epuiſé, il reſtoit la reſſource de l'amputation dans l'article."

thus to his knowledge of the artery, and try to find it out by a new incision, while he might have been conducted exactly to the wounded point by the plain direction of that wound through which the knife had touched the artery? By this wilfulness, Mr. Duschamps looked upon the artery on the wrong side; he saw it only through his incision upon the inside of the arm, while it had been wounded by a blow which came to it through the upper and outer edge of the Biceps Muscle, *i. e.* from without. In short, when the man had been wounded from the outside of the arm, his surgeon looked for the wound from within, and the consequence was most natural, *viz.* that he felt the whole trunk of the artery beating strongly under his finger, but could procure no bleeding from it, and could not see the wound. It is a curious proof of a thing, which is proved to us also by other accidents (as the aneurism from bleeding), that an artery wounded with a small and slit-like wound, though fairly wounded, yet will preserve its pulse, and will not bleed.

But when Mr. Duschamps found that his incision was too short, and that his operation was imperfectly done, or not at all, when he found his patient bleeding thus dangerously, why did he not exert himself? Why did he allow his patient to endure five successive bleedings without even undoing the dressings, when he ought absolutely to have cut open the arm? Surely I may say thus much, when he himself says, that he had almost intended to cut it off.

His incision was made from the border of the Pectoral Muscle down along half the arm, and into the

aneurifmal fac. Now, his finger had been paffed into the ftab which the knife had made, and had not by a great way gone down into the bottom of that wound; his ligature was placed no more than half an inch beyond the point of his finger, but ftill it was below the opening of the artery, as was proved during life by the repeated bleedings, and after death by diffection. Why then did he not go forward with his knife? Why, when he knew the wound to be oblique, when he fufpected it to be high, when he though it was even in the Axillary Artery, why did he not go forward into the Axilla? Why fhould he have ftopped at the border of the Pectoral Mufcle? or what is this Pectoral Mufcle that it fhould be refpected more than the other mufcles of the body?

But, in the relation of this cafe, the laft bold ftroke, the only fuccefsful one, is the moft melancholy thing of all. It explains but too well what ought to have been done at firft, and how fuccefsful it would have been, had it only been done in good time: for he cut open the arm, tied the artery fairly, prevented any further lofs of blood.

This idle incifion on the wrong fide of the arm, on the fide oppofite to the wounded point of the artery; the long fearching, without being able to fee the artery, or to force out one drop of blood; the abfurd thought of fuppreffing this bleeding by compreffion, while the pulfe at the wrift remained entire; and the frequent bleedings and the final iffue of the cafe; and moft of all, the fudden falling down of the arm fenfelefs and motionlefs, the moment that he drew his great ligature,

including of courſe the artery, vein, and nerves, are the moſt decided marks of a bad operation, ill concerted and ill performed, and are leſſons ſo important, as to make it a duty to criticiſe in theſe rude terms men even of the higheſt name; and therefore it is that I chooſe thus to do my duty, and to bear the blame.

But even in this matter of delicacy, I mean to do ſomething more, both to ſtrengthen this leſſon, and to exculpate myſelf. I will not leave it for any one to ſay, "This, after all, may be but one miſtake of Mr. Duſchamps, counterbalanced by many bold and well concerted operations." It is not ſo; and I proceed to prove that, if, as I think, he was wrong, he was habitually wrong; that theſe things were not done merely through the hurry and confuſion of ſuch a caſe, but that this way of cutting for the wounded artery at the wrong ſide of the limb, was his cuſtomary and ſettled practice.

A young man, a joiner by trade, 21 years of age, wounded himſelf with a pair of ſciſſars in the thigh, with a wound ſlaunting from without inwards and backwards; the wound was about two thirds down the thigh; the blood flowed with great force, and the young man was carried to the great Hoſpital la Charité, in Paris, where Mr. Duſchamps was firſt ſurgeon *. The next day, ſays Mr. Duſchamps, at 7 in the morning, I examined the thigh, found it ſlightly ſwelled, lifted

* "Au tiers inférieur antérieur de la cuiſſe droite, avec un ciſeau dit bédane, dont le tranchant étoit de dix lignes. Cet inſtrument pénétra de *devant* en *arrière*, et de *behors* en *dedans*, et ouvrit l'artère femorale."

the dreſſings, and as ſoon as I lifted that piece of charpie which lay immediately upon the wound, the blood jetted out in a full arch, and the place of the ſtab, and the quantity of blood, left no doubt, as to its being a wound of the Femoral Artery, nor any queſtion about the proper operation, which therefore was deferred no longer, than till 11 o'clock."

In preſence of Mr. Chopart, Boyer, and others, I then began the operation by paſſing a probe into the wound, and the direction of the wound, which it was not eaſy to purſue, carried the probe towards the Femoral Artery, and as nearly as I could gueſs, towards that point where the artery paſſes through the triceps muſcle.

" Without minding this wound at all, I made a new one of ſix inches long in the track of the Femoral Artery, ſo directed, as that the wound of the artery itſelf, ſhould moſt probably lie in the middle of this long cut. The integuments being thus opened, I diſſected through that muſcle which immediately covered the artery with all poſſible care; till I diſtinctly felt the artery beating under my finger. As there was no extravaſation of blood, and of courſe no cavity, it was impoſſible to lay the artery quite bare; but yet I cut up to it, as cloſely as common prudence would allow of; the artery wounded from behind, preſented no wound to me on this ſide, and though we ſuſpended the compreſſion at the groin, not one drop of blood flowed, either from my inciſion, or from the wound: Once more, I introduced the probe into the wound of the ſciſſars, and felt the end of the probe not naked

indeed, but near the courſe of my inciſion; with the point of my finger, I cleaned the parts, wrought with ſponges, left the artery of the groin quite free; but ſtill, not one drop of blood iſſued from either wound *.

Thus was Mr. Duſchamps left in great confuſion; certain, by the direction of the wound, and by the bleeding, that the ſciſſars had touched the Femoral Artery; uncertain only where to apply his ligatures, or how:—perplexed moreover with the doubts of his aſſiſtants, who not having ſeen the bleeding, and ſeeing and feeling now the ſtrong beating of the artery, feeling alſo the entireneſs of the pulſe below, could not believe that the wound had touched the artery. They were alſo the more inclined to this opinion, from their not underſtanding what the blunder was which Mr. Duſchamps had committed, (*viz.* cutting on the wrong ſide of the artery), which made it difficult for the artery to bleed, and impoſſible for them to ſee it bleed, whether it was wounded or not.

* "En préſence de MM. Chopart, Boyer et autres, je procédai à l'opération de la maniére ſuivante. J'introduiſis une ſonde dans la plaie; ſa direction, que j'eus de la peine à ſuivre, là conduiſit vers l'artère femorale, à-peu-près à l'endroit ou elle paſſe à travers le tendon du grand adducteur. *Sans avoir égard a cette* plaie, je fis une inciſion de la longueur de ſix à ſept travers de doigts, ſur le trajet de la fémorale, de manière que le lieu ou la bleſſure de l'artère pouvoit etre ſuppoſée, ſe trouva dans le milieu de l'inciſion; les tégumens ouverts, je pénétrai à travers le muſcle qui couvre l'artère avec toutes les précautions néceſſaires juſqu'à ce que ſon battement me fut ſenſible.

'Comme il *n'y avoit aucun epanchement ſanguin,* et par conſequent aucune cavite, il me fut impoſſible de mettre l'artere parfaitement à decouvert. J'en approchai le plus près poſſible, et autant que la prudence put me le permettre. Celle-ci, bleſſée à ſa partie *poſterieure,* ne me preſentoit aucune *ouverture.*''

Something they ſaw muſt be done, Mr. Duſchamps therefore cut and diſſected nearer and nearer to the artery, and came as cloſe to it, as he ſafely could. The probe put into the wound of the ſciſſars, ſeemed to touch the artery at the very point, where it paſſes through the triceps muſcle; he therefore ſtruck one ligature below the artery, half an inch under the paſſage through the triceps. By ſtraitening this lower ligature in a temporary way, the blood was ſtopped in the canal of the artery, and the artery was forced to bleed above; by this mark, the upper ligature was put alſo round the artery, higher than its wounded point, and the loop of this ligature being alſo tightened for a moment, by puſhing the point of the finger under it, inſtantly ſuppreſſed that bleeding, which the tightening of the lower ligature had produced. Every thing being thus ſettled to the contentment of Mr. Duſchamps, the ligatures were drawn cloſe and tied, the bleeding was ſuppreſſed, the wounds were dreſſed lightly, and every thing went on well for ſeven days, the limb had recovered from the loſs of its main artery, and what is always more doubtful, the artery itſelf continued ſecure. But on the ſeventh day, thoſe ſecondary bleedings came on, by which ſo many patients have died, and it was after encountering great difficulties; after many burſtings of the artery, after much loſs of blood, and, of courſe, an irreparable injury to his conſtitution, that this young man was ſaved: In ſhort, they ſaved with great difficulty, a young man of a laborious profeſſion, in the very prime of life; the arteries young, and in that flexible condition,

in which we ſhould have the beſt hopes of procuring a ſpeedy adheſion, of making an uninterrupted cure! —This is a caſe, which preſents this queſtion ſtrongly to us, Why ſhould not the artery have kept ſteady the very firſt tying, if it was poſſible to keep it ſteady in the end?—But as I have paſſed already through all thoſe rules, which direct the manner of ſecuring any great artery, I refrain from mentioning many of the unfortunate accidents of this caſe, keeping plainly to the point in queſtion.

It is ſufficient to ſay, that Mr. Duſchamps had made miſtakes in the very beginning of this caſe, which never after could be put to rights: and all the frequent yieldings of the artery, and the terrible loſs of blood, were owing merely to the artery being irregularly tied.

What buſineſs had Mr. Duſchamps to truſt ſo much to his own knowledge, or to make an inciſion in the courſe of the artery, when he might ſo eaſily have taken the plain direction of the wound? Why ſhould he have looked on the inſide of the Femoral Artery, for the wound which had reached it from without, and which, he might have known, had touched the artery, only on its back part? At the time when he might have ſeen his miſtake, why did he continue cleaning and working on the inſide of the limb, at the inciſion which he himſelf had made, when he might ſo eaſily have enlarged that wound, through which the point of the ſciſſars had touched the artery? Surely, if the wound was not on the fore part of the artery, where he was looking for it, it muſt have

been behind; why then did he continue diffecting, very dangeroufly and difficultly, upon a found part of the artery, when he might have gone to the wound of the fciffars, and diffected the artery at a place, where being already wounded, it would have been lefs unfortunate, even although he fhould have touched it again? But what temptation, above all, had he to forfake the courfe of the natural wound, fince he had feen, (when with his own hand, he firft lifted the dreffings), a high arch of blood thrown directly from that wound? as Mr. Dufchamps durft not make his diffection fo clean, as abfolutely to touch, or to furround, or to infulate the artery; what had he to expect from the deep ftroke of his aneurifmal needle, with which he placed the ligature? Nothing furely, but that it fhould fupprefs the bleeding only for the time, to burft out more furioufly, when the flefh under the ligature faded, and more dangeroufly, fince it might burft out as fuddenly in the night, as during the day, perhaps after the attendants were exhaufted with watching; or when by ufe and cuftom, they were grown carelefs and too fecure.

That the flacknefs of the ligature, was plainly owing to the fading of the parts, which were included along with the artery, is proved by the following paffage: "When, on the evening of the feventh day, a violent hæmorrhagy came on, I lifted the dreffing, and found the ligature fo relaxed, that it had no longer any purchafe upon the artery, having in a great meafure, cut through the mufcular flefh,

Now, if the dreſſings had been lifted, and the ligature found thus ſlackened twenty-four hours after the operation, I ſhould have thought Mr. Duſchamps not far wrong in ſaying, "for the ligature had cut through the muſcular fleſh;" but when on the 7th day, he finds this ligature ſlackened, and the muſcular fleſh gone, he ſhould have ſaid rather, "the muſcular fleſh under the ligature having gangrened, and being conſumed, I found the ligature quite looſe *."

OF OBLIQUE WOUNDS WHERE THE EXTRAVASATED BLOOD DESTROYS THE TEXTURE OF THE PARTS.

But when an oblique wound touches an artery, where it lies deep under the fleſhy bellies of many ſtrong muſcles, or cloſe betwixt two bones, upon their interoſſeous membrane, as in the arm or leg; the caſe is ſtill more diſtreſſing: A ball, we will ſuppoſe, paſſes along the fore arm, rakes along the two bones, wounds the Radial or Ulnar Artery in the bottom of a deep and narrow wound, and then paſſes out beyond the elbow, making an opening too ſmall to let out the blood; or we will ſuppoſe the oblique ſtab of a knife, ſword, or bayonet, touches an artery, lying thus in the heart of the fore arm, under all the muſcles, and cloſe upon the bone; then the following

† Je levai l'appareil; à l'examen, je trouvai la ligature relachée, et telle qu'elle n'avoit plus aucune action ſur l'artère, les parties muſculaires, compriſes dans la ligature, etant en partie *coupées*."

consequences ensue. The profuse bleeding, at first, proves that some artery is wounded; the direction of the wound should ascertain which artery it is; the stopping of the outward bleeding, causes an internal aneurism, different from the greater aneurisms of the arm or thigh, as it lies not under a fascia, forming a fair circumscribed aneurismal bag, but under the bellies of all the muscles, which are separated from the bones, by a very irregular and a very dangerous collection of blood; the outward bleeding is soon stopped by compresses, and a bandage; the friends are less alarmed, seeing nothing but a narrow flaunting wound; but when the next morning, they see the arm black with the injected blood, and swelled to an enormous degree, their fear is like their indifference before, quite ignorant, and beyond the true measure; they believe this to be an absolute gangrene, and that the patient is lost; while the surgeon sees in this blackness, not the signs of gangrene, but the marks of a wounded artery, and foresees a difficult and tedious operation of seeking it out. But if again the surgeon have not the skill to foresee all the dangers of the case, the apparent gangrene is soon changed into a real one; the limb becomes cold, benumbed, and has a livid redness upon its surface; the skin without runs into a low inflammation; the blood within increasing every day, corrupts and bursts out; and thus, as I have hinted before, it is not merely by the the wound of its great artery, and by losing the great trunk that nourished it, that a limb is lost; but in a case like this, it is lost by the deep

driving of the blood among the flesh and bones. Either the outward bleeding is allowed, and the patient is in danger of immediate death, or the blood is confined, and the bleeding goes on within; so that every time the artery bursts out, the limb is injected anew, as it were, by the arteries, and is in imminent danger of gangrene at every new effusion of blood. The matter is bloody, fetid, corrupt; it prevents the reunion of the bones, (if any bones be broken), it makes foul suppurations, and extensive and fetid sores; and each new suppuration is succeeded by a dissolution of those clots which had for a time stopped up the artery, so that again the blood bursts out; till at length, after many months of suffering, the patient is forced to part with that limb which he has undergone so many dangers to preserve. The extensive sinuses, and foul sores, the disorder of the joints, and the total caries of the bones, makes every such case incurable; so that there is, even from the very first moment, no other alternative for the surgeon, than either to perform immediately a bold decisive operation, or to resolve at once (not keeping the patient in this lingering and cruel condition) to cut off the limb; and to the patient himself the questions may be honestly proposed in these terms: "Will you have this tedious, but necessary operation, of tying the artery, regularly performed? Or will you, to shun a present pain, linger for months in this miserable condition, consenting at last even to lose the limb, when it is perhaps too late to save your constitution, or even your life!"

This is the full description of that cafe, which I hinted at in the beginning of this difcourfe, when I faid, that fometimes the arteries are wounded deep among the mufcles, and there the blood corrupting the mufcular flefh, and even fpoiling the bones, is the occafion, after long fuffering, of the patient's lofing often his limb, and fometimes his life: As the beft examples of thefe dangers, I fhall extract for your ufe, the following inftructive cafe from Mr Allanfon's Book upon Amputation*.

* As one proof of the neceffity of cutting boldly, obferve what Gooch fays, p. 341. " Among the reft of our converfation at this time, there was mentioned a cafe, in which one of the arteries betwixt the tibia and fibula was opened about the middle of the leg, and the bleeding was ftopped from time to time by various methods, but at laft it was thought advifable to amputate the limb." Mr. Gooch propofes rather to cut out two or three inches of the fibula, and fo expofe the artery; and I would add, that I fhould rather do any kind of operation, however cruel and tedious, than cut off the leg.

The imprudence of confining the blood, or of delaying the operation is well explained by the notes which our old Surgeon Wifeman gives us, of a cafe in which he was trying to cure a popliteal aneurifm by aftringents and by compreffion. He informs us, p. 122. " That while he endeavoured to keep the blood within the abfcefs, it infinuated itfelf between the mufcles, making the calf of the leg hollow to the very tendon." This, we find, obliged him to make long incifions through the brawn of the leg, before he could accomplifh the cure. In fhort, whether the artery requires to be tied, or whether the bleeding ftop, we fhould neither confine the blood nor procraftinate our operation; nor make our incifion too fmall; for the driving of the blood in this leffer, as in the greater aneurifms, diforders the foft parts, fpoils the bones, puts the artery further and further out of our reach; and makes the abfcefs extenfive, the operation difficult, and the cure tedious; fmall incifions alfo prevent the artery from being well feen and cleanly tied.

Harry Knowland, a ſeaman, was wounded, in an engagement at ſea, with a ball, which entered under the patella, broke the tibia and fibula, obliquely near their upper end, paſſed obliquely through the leg backwards, and a little downwards, and came out at the middle of the calf of the leg, followed by a great bleeding from the wounded arteries, and many ſplinters of bone.

A well inſtructed ſurgeon would have made a large and bold inciſion, laid open the wounded veſſels, that he might tie them; would have picked away all the looſer ſplinters of bone, but he would have been careful, above all, in tying the arteries, knowing that if they continued to bleed outwardly, the patient might die; if inwardly, that they muſt inject the leg ſo ſtrongly with blood, that it might fall into gangrene, and would, at all events, run into a foul and gangrenous ſuppuration. That the bones alſo, far from reuniting, would in a few weeks, be throughly and irrecoverably diſeaſed.

A fortnight after this wound, nothing having been done, meanwhile, to ſave his limb, this man was carried on ſhore and put into the Liverpool Infirmary, where he lay four entire months. At firſt his knee and the whole leg were greatly ſwelled; the leg and foot cold and œdematous, with a very languid circulation through the whole limb: He had moreover a fever upon him, with a great depreſſion and languor, a foul tongue, and a ſmall quick pulſe.

When the bullet holes were firſt dilated, there iſſued a great quantity of ſanies highly fetid, mixed with clots

and putrid blood. ' Bark and wine were uſed during this putrid or gangrenous ſtate; and free dilatations were made when the time arrived, for giving vent to the foul ſuppurations.

' In the courſe of this tedious caſe, the callus often began to form, and they had hopes of accompliſhing a cure; but the deep ſeated hæmorrhagy continually returned upon him, coagulated blood was accumulated anew in every part of the limb, with a new diſcharge of putrid ſanies, new ſinuſes, new ſuppurations; and thus, from time to time, the incipient callus was deſtroyed.

Four months they ſtruggled againſt theſe diſappointments and difficulties, ſupporting him all along with diet and wine, often dilating the openings for the putrid ſanies, ſometimes extracting the ſplinters of bone, till at laſt ſuch a bleeding came on, as put an end at once to all hopes of a cure. The whole limb was relaxed and ſwelled; the cellular ſubſtance gorged with coagulated or putrid blood; the hæmorrhage came deep from among the callus, from the very centre of the limb; the man was quite emaciated; his ſtomach was ſo enfeebled, that he could receive no ſolid food; his health was already broken, and it was plainly imprudent to ſtruggle longer, and impoſſible to ſave the limb. The limb was cut off*.

* Upon injecting the amputated limb, the wound was found to be in the poſterier tibial artery. It had been cut entirely acroſs by the ball; the upper end indeed had, by ſome accident, cloſed up; and at the final hæmorrhagy, perhaps alſo at many of the former hæmorrhagies, the blood had come from the lower end of the wounded artery, it having returned freely by the inoſculations of the foot;

The plain rule refulting from this cafe needs hardly be explained; it is fcarcely more than a recapitulation of that rule which has been already delivered: but it puts it in a ftronger point of view, *viz.* that we fhould cut boldly; feek freely for the artery; tie it fecurely with the needle: and it is only where the artery can by no means be taken up with the needle, that you are at all to truft to the fponge, and even then, not willingly, nor without every precaution of firm compreffes, tight bandage, a tourniquet to fecure the patient from any deadly hæmorrhagy, and the appointing of attendants well accuftomed to fuch a charge.

DISCOURSE V.

ON GUN-SHOT WOUNDS.

THERE ſeems to be a ſort of myſtery in the buſineſs of gun-ſhot wounds, which ariſes merely from the ſingular ideas which the older phyſicians entertained concerning the nature of ſhot. For gun-ſhot wounds are made by a blunt round body, which inflicts a deep and dangerous wound, and ſo bruiſes the ſurrounding fleſh, that the wound is at firſt livid, ſoon becomes black, has little bleeding and no pain, ſoon falls into actual gangrene, and is extremely difficult to heal.

Here then are ſome ſtrange peculiarities; and it is excuſable, or at leaſt, it is not wonderful, that the older phyſicians, ignorant of the laws of the animal economy, and of the properties of the living body, ſhould have agreed that there was ſomething very particular in gun-ſhot wounds, which ſome, on account of the blackneſs, aſcribed to the heat of the ball, and theſe ſuppoſed every gun-ſhot wound to be a burnt wound; while others believed, that the powder was of a dangerous nature, and that a ball made of neceſſity a poiſoned wound: There were others again, who being

actually engaged in war, and as yet but little acquainted with fire arms, believed that their enemies were ſo barbarous as to poiſon their balls. Parée tells us, that while the King of France was beſieging Turin, the beſiegers and the beſieged mutually believed that their enemies had poiſoned their balls, ſo cruel and untractable were the wounds; but after the taking of the city the ſoldiers of both parties met, and then they ſaw that their own clean and unpoiſoned balls had made the ſame cruel wounds. But beſides, it often happens, that when a man is ſhot, he is overtaken with an awful trembling and diſorder of the nervous ſyſtem, the braveſt cannot reſiſt it, and the moſt acute phyſiologiſt cannot tell whether it is a diſorder of the body or a tumult of the mind. This too is peculiar, and ſerved to confirm the common opinion, *viz.* that theſe were poiſoned wounds. What indeed could more reſemble the bite of a ſerpent or ſome poiſoned wound, than an inſtant affection of all the body, a trembling and unaccountable ſinking within, yellowneſs of the face, paleneſs of the extremities, a failing of the pulſe, and a livid wound from which no blood was diſcharged.

I ſhall comment upon the true cauſe of theſe ſymptoms in the concluſion of this diſcourſe; but, in the meanwhile, it is natural to obſerve, that almoſt every doctrine has drawn after it ſome peculiar practice, good or bad, dangerous or uſeful; and this pernicious doctrine of there being ſome kind of poiſon in a gun-ſhot wound, has been the root of all the harſh practices and cruel operations of the older ſurgeons: for, in order to ſubdue this poiſon, they made deep inciſions, applied

the actual cautery, burnt the wounds with turpentines or hot oils; and the phyſicians who took the direction in thoſe days, would not in any circumſtances allow the ſurgeons to bleed, leſt the poiſon ſhould thus be drawn back into the veins.

"Our daily experience, ſays Barbetti, proves to us but too well, how poſſible it is to poiſon balls, and we can diſtinguiſh ſuch poiſoned wounds, by the vehement pain, livor, ſudden blackneſs, and ſymptoms terrible quite beyond the nature of a common wound; as burning heat, trembling, fainting; while even the ſmalleſt poiſoned wound, eſpecially if neglected, or near the vital parts, brings preſent death. Bleeding or purging are dangerous, (for theſe draw the humours inwards); the poiſon may be extracted, by ſcarifications, by cupping-glaſſes, by drawing medicines, or beſt of all, by the actual cautery: But to expel the poiſon, our chief internals are ſudorifics and cordials *."

This which is, I believe, a fair and honeſt ſample of the notions of the older ſurgeons, concerning poiſoned

* Quotidiana experientia globulos venenatos effici poſſe docet.

Vulnera venenata Globis, ſagittis, gladiis aliiſque inſtrumentis, plus nocent vi venenata, quam vulnere; ſigna ſunt dolor vehemens, color lividus mox niger, ſymptomata gravia præter rationem vulneris: In toto corpore ardor, tumor, delirium, lypothymia, &c. Vulnus etiam exiguum venenatum mortem afferre poteſt; imprimis ſi loco cordi, aut parti alii nobiliori proximo extiterit; curatio in hoc præcipue conſtitit ut Venenum Extrahatur, cucurbitulis, medicamentis extrahentibus, ſcarificatione aut, quod tutiſſimum, actuali cautereo, &c. Interne medicamenta proſunt *ſodorifica atque cardiaca* nocent venæſectio et purgatio.——Pauli Barbetti, Chirurgia, Liber de Vuln. Venenat.

and gun-ſhot wounds, is ſuch miſerable ſtuff, as I ſhould think it needleſs to mention to you; were it not, that hints like theſe, concerning the hiſtory of ſuch matters, enlarge the mind, and ſet it free from prejudice, more than the moſt ſerious and laboured arguments could do, more than even experience itſelf. It is alſo ſuch folly, as can be believed only by thoſe who are acquainted with the abſurd notions of the older phyſicians, concerning common wounds. The myſteries which they utter on thoſe high occaſions, involved in ſtrange terms, are very amuſing. The ſame Barbetti tells us, very gravely, "that wounds of the lungs, require comforting and drying medicines." "That ſpermaceti, though it heals the lungs, damages the brain*." "That in a wound of the eye, the blood of cocks and pigeons, is very good; but that the patient had better have nothing to do with eating bacon †."

Parée, a ſurgeon whom I have often taken pleaſure in ſpeaking of, was a man of extenſive knowledge, and ſterling good ſenſe, and had the abilities and the courage to be a thorough reformer: and we find him continually warring againſt the miſtakes and prejudices of the older ſurgeons. "I had heard of nothing, ſays he, ſo often as of the poiſoned nature of gun-ſhot wounds, and had read both in De Vigo, and in Guy De Chauliac, of the ways of burning them with boiling oils. When the French armies made their way into Pied-

* Spermaceti drachmæ dimidiæ pondere quotidie adſumptum in vulneribus pulmonum inſigniter operatur, at cerebrum debilitat. P. 206.

† Sanguis turturi columbæ, galinæ, &c. conveniunt in vulnere oculorum, ſed ab omni pingue abſtinendum. P. 204.

mont, many of our ſoldiers, ſays Parée, were wounded in the ſmaller garriſons: And I ſaw the army ſurgeons uſing their terrible cauteries, and I alſo followed the common practice, and dreſſed the wounded with boiling oils, until all my oils were expended. On the night on which this happened, I dreſſed my wounded ſoldiers with oil of roſes, and turpentine, with whites of eggs. I went to bed much oppreſſed, with the apprehenſion that all theſe poor fellows would be found in the morning poiſoned and dead. I aroſe therefore betimes, and learnt, to my infinite ſurpriſe and pleaſure, that they had ſlept well and eaſy; without any pain, or ſwelling, or redneſs about the wounds; while thoſe of my ſoldiers who had been cauterized with the hot oils, had great fever, and ſwelling, and excruciating pain." This fortunate accident determined Parée in favour of the milder dreſſings, and was moſt probably the cauſe of all his future ſucceſs. " I have, ſays Parée, been in my time chief ſurgeon to ſix warlike Kings of France, often in battles, and often ſhut up in beſieged towns: for 30 years I have never uſed thoſe burning oils, and I have never loſt one patient, whoſe death could not be fairly accounted for by his bad habit, or by a contagious air!"

There is another curious anecdote, connected with this reformation of Parée's practice, which both ſhows the ignorance of the age he lived in, and demonſtrates in a particular manner, that thoſe among the cauterizing ſurgeons, who uſed milder dreſſings, were ſure of acquiring a high name.

After the taking of Turin, Parée insinuated himself into the good graces of a man, who had a high character for curing gun-shot wounds; and having attended this surgeon, for two years, Parée when about to leave Turin, prevailed upon him to disclose this great secret. He made Parée gather a pound of earthworms, and procure two living dogs, he infused the earthworms in white wine, and put the live dogs into boiling oils, till the flesh separated from the bones, then mixing them, he made a mild ointment, and this, he took a sacred oath, was the balsam with which he performed such wonderful cures. The "oil of whelps," (for Oleum Catellorum is the name he gives it; by which it was long known and much used by all the surgeons in Europe),—would make a strange figure in a Dispensary list; but we find Parée often prescribing the earthworms, and boiled whelps, as an excellent mild application for softening and bringing off the eschars, and for easing the wounds. No doubt this prescription, though ludicrous in some respects, was infinitely preferable to boiling oil. Parée used it with great success, and the inventor of this foolish but mild ointment had got an established reputation by it; Parée recommended these mild dressings so effectually, that the chief surgeons of his time followed his example, and thus ended the practice of hot turpentines or boiling oils.

There are other prejudices of the present day, concerning the effects of a cannon ball, not less absurd, than those older notions concerning the nature of gun-shot wounds: It is, for example, believed, that even

the whiff and wind of a ball, will extinguiſh life. I have heard ſenſible men of our profeſſion affirm it. We find Belguer, the famous Pruſſian Surgeon, perfectly convinced of it; and Tiſſot, in tranſlating a book upon gun-ſhot wounds, ſets himſelf gravely to prove by many laboured calculations, how intenſe the force muſt be of that air, which is preſſed forwards by a cannon ball. This way of talking ſuits very well an ignorant midſhipman, or the coarſe boatſwain of a man of war; and many a good tale, no doubt, goes round in the cock-pit about this wind of a ball; but it is unpleaſant to obſerve men like Belguer talking ſo idly about this matter. Surely Belguer, of all people, might have known, that a man's right leg is often ſhot away, the breeches of the left thigh torn, and yet the thigh itſelf ſafe; and ſurely he muſt have ſeen the arm torn from a man's body, while his body has yet remained unhurt; how could a ball paſs cloſer to the body, than in tearing off the arm? and when can this wind of a ball be dangerous, if ſuch a man eſcape? Surely, Mr. Belguer muſt alſo have ſeen an officer's leg carried away by a ſhot, which had not hurt his horſe, or a ball carrying off a man's arm, while his fellow, who ſtood cloſe up to him in the ranks, received no hurt.

Nay, ſtill further, caſes ſtand upon record, from the very beſt authority, of ſoldiers whoſe arms had been carried away by the ſhoulder joint; yet they ſuffered nothing but the loſs of their arms, from which alſo; they have recovered well.

But yet there is no report of this kind, however ſtrange, which has not ſome meaning; and the reaſon

of all theſe wonderful tales, about the wind of a ball, is itſelf very wonderful; men often fall in the field of battle, and when the camp followers come to turn over their bodies, in burying their dead, no wound nor mark of injury is ſeen; and often alſo, men are laid in the military hoſpitals, dying and unable to ſpeak, upon whom there is found no kind of wound, nor even the ſlighteſt bruiſe of the ſkin.

Now this apparent difficulty will diſappear entirely, when I inform you, that often a limb is broken, while the ſkin remains unhurt, and a dreadful fracture it is: for when a great bullet ſtrikes fairly, it knocks off the limb; but when it ſtrikes obliquely, it buffs along the ſkin, the ball is turned away, and the part ſtruck, becomes inſenſible in the inſtant; there is no feeling of the terrible accident that has happened, the patient is ſenſible of nothing more than a confuſed ſhock; hardly knows where he is ſtruck, and falls down. This fracture is of the worſt kind; for it is accompanied with ſuch a bruiſing of the parts, that they never can be reſtored; and though the ſkin is ſtill entire, there is much blood extravaſated, the muſcles are in an inſtant reduced to a gelatinous and pulpy maſs, the bones are broken, and the fleſh, and the perioſteum are to a great extent torn from the bone; they are often ſo torn, that the limb cannot be preſerved.

Let a ball hit any of the great cavities thus obliquely, and this phenomenon appears; the patient is killed without any external wound. He is killed, according to the notion of his fellow ſoldiers, by the wind of ſome great ball: But we know that the ball has actually

ſtruck him, that the breaſt, the belly, or the head, have been hurt. If the cheſt has been ſtruck, then the ribs have perhaps yielded, and eſcaped the blow; but the lungs have ſuffered, and often there is blood extravaſated in the cheſt, which ſuffocates the lungs: in the belly there is often a burſting of the liver or ſpleen, without any outward wound of the ſkin; very frequently in the head, though there appears no outward injury, the pericranium is ſeparted from the ſcull, or there is an effuſion of blood upon the brain. Nor is this piece of knowledge entirely without its uſe; for extravaſations of this kind, have been ſometimes diſcovered by the pulſe, and breathing, and have been relieved by making inciſion into the belly or cheſt.

Gun-ſhot wounds, then, are not poiſened wounds; for no ball is poiſoned on purpoſe, and as for powder, it is ſo far from being hurtful, that it is often uſed by ſoldiers to waſh their wounds with, or ſprinkle upon their ſores; and often, as Magatus obſerves, when they are infected with venereal ſores, they burn them with gunpowder; nor are gun-ſhot wounds burnt by the heat of the ball; for if you fire your piece againſt a ſoft body, upon picking up the flattened ball you will not find it heated. Nor is there any ſuch thing as an injury, much leſs death, ariſing from the wind of a ball; but when a great ball hits a limb obliquely, it breaks the bones, without injuring the ſkin; and of courſe, when a ball buffs along the ſurface of any great cavity, though the ſkin is left entire, the bowels within are hurt, the lungs or liver are

burſt, and the cavities of the abdomen or thorax being filled with blood the perſon dies.

Without, therefore, any ſuch childiſh repreſentation, there is enough truly wonderful and dangerous in the nature of gun-ſhot wounds, to occupy our attention; and theſe real accidents, I ſhall now try to explain to you.

1. There is that trembling, fainting, and unaccountable fear, which comes over every man, the brave, and the daſtardly, the ſtrong, and the weak; like the flutterings of a wounded bird, unaccompanied with any diſtinct ſenſe of danger, and without the leaſt degree of pain.

M. Le Dran in ſpeaking of this ſymptom, does not cover it with the delicacy, or rather cunning, of Ravaton or La Motte; he does not argue with them, that "this confuſion cannot be the effect of fear, in a nation noble minded and courageous to exceſs, and who often lying mortally wounded upon the field of battle, are heard encouraging their companions to fight bravely for their king and country." Le Dran deals more honeſtly. He had perhaps as high an eſteem for the courage of his own countrymen; but he knew that there was no need for boaſting of that national courage which had been ſo often ſhown. Le Dran declares the plain fact, without any colouring or reſerve: "From a principle," ſays he, "which nature has eſtabliſhed in the human mind, it is, that as ſoon as one feels himſelf wounded by fire arms, he is ſtruck with a panic and oppreſſion too violent to be concealed. In that firſt moment of alarm, his reaſon

gazes on nothing but danger, and there often follows a deprivation of almoſt every ſenſe." And ſo regular is this ſymptom of trembling, fainting, and nervous affections, upon receiving a great wound, that the old phyſicians, who would account for every thing they ſaw, and who too often would ſee nothing, unleſs they could account for it, aſcribed the trembling and diſorder to that motion or trembling of the part, which was excited by the rapid motion of the ball *.

Thus the firſt ſymptom which follows a dangerous wound, is a trembling ſo ſudden, ſo violent, ſo unaccountable to the wounded perſon, that it is at once a conſequence and a cauſe of fear. There is a fluttering, oppreſſion and fainting; there is univerſal coldneſs and a trembling of the pulſe; there is a yellowneſs or a livid colour of the face; and often, there is not confuſion merely, but abſolute inſenſibility, which continues during the ſcarification of the wound, or during the amputation of a limb; and in one caſe the patient continued ſtiff and quite inſenſible to all that was done to him, till death †.

2. A gun-ſhot wound being formed by a round and bruiſing inſtrument, muſt have the appearance of

* Mr. Belguer accounts for it by this concuſſion. Vide his marginal note, P. 57, and his text in P. 56. Atque ea quidem univerſi corporis commotio ab aere externo qui a tormenti grandioris globe perniciſſime propulſo provolutoque comprimitur, condenſatur, celerimeque agitatur.

† Vide Mr. Queſnoy's Eſſay on Gangrene.

one formed by a club, or any ſuch blunt weapon, *i. e.* there will be a laceration rather than a clean cut, and there will be extravaſated blood where the ball has ſtruck, much disfiguring the lips of the wound; and thus the following appearances and changes ſucceed each other in the following order: The wound is black round the edges; this livid part falls into gangrene; the gangrenous parts fall off in a few days; and when theſe ſloughs give way, a profuſe bleeding very often comes on. Theſe are the true peculiarities of the gun-ſhot wound. The extravaſated blood makes it black or livid; the bruiſe of all the ſurrounding fleſh occaſions a ſuperficial gangrene; the gangrene too often goes deeper than the ſurface, for all the ſurrounding parts are ſo much hurt by the ſhot that they gangrene almoſt as ſoon as they inflame; and the inflammation alſo of gun-ſhot wounds muſt often run very high, ſince there is a violent wound, that wound goes deep among the fleſh, the opening is narrow, and there is often a foreign body, a ball, or pieces of cloth, lodged at the bottom of the wound.

3. Since a gun-ſhot wound is truly a bruiſe, begins with inſenſibility and ends with gangrene, the ſuperficial gangrene or ſloughing of the ſores is the chief characteriſtic of gun-ſhot wounds, and each of theſe accidents deſerves notice, not merely on account of the peculiarity itſelf, but of the rule of practice which it draws along with it.

As for the trembling, coldneſs, and change of countenance, though it would lead one to apprehend that ſome of the viſcera or ſome great artery were wound-

ed, it is no ſign of danger, but goes off in a few hours, and, as after the cold fit of an ague, an intenſe fever ſucceeds. If any thing be required, it is only an opiate or a cordial.

The narrowneſs of the orifice, and the ecchymoſis or bruiſed appearance of the wound, are the great peculiarities of a gun-ſhot wound. " No gun-ſhot wound heals by adheſion ;" every gun-ſhot wound ſuppurates, or in other terms, inflames. To make that inflammation eaſy, and to relieve the ſtricture of the narrow opening, we ſcarify or open up with the ſcalpel both the mouths of a gun-ſhot wound.

The ſloughing is cauſed by the bruiſe; the bruiſe deadens the parts, ſo that they feel no pain; while they feel no pain, they pour out no blood ; but on the eighth, tenth, or fifteenth day, the wound is inflamed; the active veſſels now throw off the dead parts; this diſcharge of the ſlough throws all the veſſels open, and thus the veſſels which had not bled, burſt out upon the eighth or tenth day: And there, of courſe, follows a caution of the utmoſt importance, that it is the nature of a gun-ſhot wound, to bleed little, at the time the wound is inflicted, but to burſt out ſuddenly, and to bleed furiouſly, at the falling off of the eſchar, that is on the eighth, tenth, or fifteenth, days ; at that time, it muſt be watched with the utmoſt care, for the blood often burſts out during the night, and in the morning the patient is found dead, bathed in his blood.

Thus the myſtery of gun-ſhot wounds vaniſhes, when we conſtrue all their appearances into the com-

mon operations of the economy; it is not becauſe they are poiſoned or burnt, that they are thus malignant; but it is becauſe they are bruiſed, that they gangrene; it is becauſe they do not at firſt bleed, that their after bleeding is ſo dangerous; it is becauſe they are deep, penetrating, and ecchymoſed, *i. e.* bruiſed, that they appear malignant, and do not eaſily heal.

DISCOURSE VI.

ON GUN-SHOT WOUNDS.

IN my laſt diſcourſe, I explained to you the peculiar nature of gun-ſhot wounds. "I obſerved that it is not becauſe they are poiſoned or burnt, that they ſhow their malignant nature; but is becauſe they are bruiſed, that they gangrene; it is becauſe they do not bleed at firſt, that their after bleeding is ſo dangerous; it is becauſe they are deep, penetrating, and bruiſed, that they appear malignant, and do not eaſily heal." In theſe ſhort definitions, are pretty accurately marked the chief peculiarities of gun-ſhot wounds; and their peculiar nature draws after it a peculiar practice; for it is to open this narrow wound, to unload the pent up veſſels, and to quicken the falling off of the bruiſed parts, that we ſometimes ſcarify thoſe wounds; this ſcarifying converts ſuch a wound in ſome degree, from its peculiar nature as a gun-ſhot wound, to that of a freſh, open, and bleeding wound. Thus the motives for this practice, are laid down in a general way; and taking this for my text, I ſhall proceed to branch out

this practice of scarifying, and probing, into all its operations.

1*st*, I shall explain to you, how you are to examine a gun-shot wound; how to guess at its direction, to prognosticate its event, to declare whether any of the viscera, or any great vessel or nerve, be wounded.

2*dly*, I shall teach you how to scarify a gun-shot wound, so as to open its vessels, loosen the bruised parts, and leave a free opening, as a drain for the matter, or for the extraction of the ball.

3*dly*, I shall just put you in mind of avoiding the arteries, or tying them when cut; and,

4*thy*, I shall give rules for the extraction of balls, cloth, splinters of bone, or of any foreign bodies, which might prevent the healing of the wound.

I know very well that these heads of discourse will seem very short, and that you will think they might be easily delivered, almost in the direct and plain form of practical rules. But in truth, the details which fall under these four heads, contain the whole of practice; and in order to instruct you thoroughly, I must first teach you by lesser directions, many of which must go to make up a great rule. But rules of practice are so satisfactory to the young surgeon, so easy to be remembered, and keep the judgment so clear, that in a matter like this, I shall be careful, first, to instruct you in all these minutiæ of practice, and then to collect these particular directions, into general and formal rules.

I. OF EXAMINING GUN-SHOT WOUNDS.

No ſooner does the ſurgeon ſee his wounded ſoldiers carried into his tent, than the very ſight of a man, pale, and perhaps bleeding, awakens the ſtrongeſt intereſt, and a lively anxiety, to know the nature of his wound; but how much ſtronger muſt the patient's own feelings be, who waits in awful ſuſpenſe, while he learns even from the countenance of his ſurgeon, the ſentence of life or death!

A ſurgeon of experience no ſooner caſts his eyes upon his patient, or feels his pulſe, or puts his finger into the wound, than he has ſome preſentiment of the event. But ſuppreſſing all haſty concluſions, which are ſo often corrected by reflection, he begins to examine his condition more deliberately. He obſerves, firſt of all, the trembling, fainting, ſtupor, and paleneſs; but this agitation of the ſyſtem, he knows to be natural, and that it is no cauſe for apprehenſion; he knows, that it will go off by compoſure, cordials, and reſt. Then, if the wound be near the belly or breaſt, he obſerves the breathing, and feels the pulſe, for it is by theſe, that he gueſſes whether it be a dangerous wound. If with a wound of the breaſt there be great oppreſſion of breathing, and the pulſe fluttering, interrupted, or very weak, but more eſpecially, if there be a blaſt of air from the lungs, there muſt be danger. If from a wound of the belly, there be lowneſs and inſenſibility, frequent fainting, a weak pulſe, and the extremities cold, then ſome great vein or artery is wounded; there is a bleeding within; the belly ſwells, the

breathing is oppreſſed, the faintings increaſe, and how long ſoever life may be ſuſpended with ſuch a wound, the patient muſt die.

There is nothing in which good ſenſe, and a correct judgment, and above all a humane temper, may be more particularly diſplayed, than in this of probing wounds: To a man of ſkill, and real knowledge in anatomy, the direction of the ball, will of itſelf declare the danger; the ſymptoms will confirm that terrible ſentence, which he has ſecretly conceived; and ſeeing what is likely to happen, his good ſenſe and feeling, will reſtrain him from making inquiries, which muſt give the patient alarm and pain, and which cannot relieve nor ſave him. How oppoſite to this modeſt conduct, is the temper of thoſe, who, with a flippant vanity, will introduce their probes among the viſcera of the breaſt or abdomen, where they never ſhould be; from the contemptible deſire of exalting their own little character, by pronouncing their opinion over a dying man? Turning their dying patients, ſays Ravaton, with what I would call a cruel ingenuity, into the particular poſture, in which they happened to receive their wounds, declaring with great pomp, that the wound is in the ſtomach, the liver, or the lungs; while it is plain, that ſuch opinion has no influence on our practice, nor any relation to the patient's ſafety. Surely no ſuch idle thoughts ſhould be indulged; perhaps a ſurgeon might be hurried into this folly, by the anxiety of friends, inquiring with eager haſte, whether the patient were ſafe, and ſeeming to make the prognoſtic their teſt of the ſurgeon's ſkill. But a

ſurgeon ſeeing his patient's danger, and knowing that it would cauſe more danger, and put him to needleſs pain, were he to ſearch his wounds; ſhould be ready to ſet a guard upon his own actions, and forego a little momentary reputation, for his patient's ſafety: and yet after all, it is perhaps no ſacrifice; for faithful and good conduct, which brings the trueſt reputation, is diſtinguiſhed even by the ignorant in the end.

Our ſurgeon Ranby, agrees with La Faye and Ravaton, in refraining from uſing the probe, in wounds of the belly or breaſt; "for thruſting the probe down into theſe cavities, is at every repetition of ſuch practice, a freſh ſtab *." This practice ſeems to have gone as much againſt his feelings, as againſt his judgment; for he ſays, "I never could bear the thoughts of thruſting a long pair of forceps, the Lord knows where, without any probability of ſucceſs †."

But to paſs over authorities, the plain reaſon for not probing too curiouſly in wounds of the liver, lungs, bowels, or other internal parts, is, that our conduct is nothing affected by it; after ſuch a wound, we lay the patient quietly in bed, there to take his fate; we wait for ſymptoms, and judge by them of his condition: It is only by the courſe of the ſymptoms, that we are regulated in our practice, and not by an apparent danger in the wound; we find it is better for our patient, it is even ſafer for our own reputation, (if thoughts concerning it, are to be allowed), to refrain from theſe uſeleſs ſearchings; for wounds are often

* Page 6. † Page 8.

really dangerous when we believe them ſafe, and ſtill more frequently, it happens, that we believe them dangerous when they heal without one bad ſign.

This leſſon cannot be better enforced, than as it was delivered by La Motte, to a ſurgeon, who ſhowed himſelf too well prepared to do ſomething, before he could tell what needed to be done. It was in the caſe of a young gentleman, who had been wounded with a rapier, quite acroſs the belly, from ſide to ſide; his ſurgeon had provided abundance of probes, ſciſſars, needles, and knives, of all kinds; but La Motte, taking the privilege of an old maſter in ſurgery, told him calmly, that there was no need for all that frightful armoury; the courſe of this weapon, ſays he, is but too plain, and if the bowels be really wounded, I fear we ſhall know it but too ſoon. Accordingly, La Motte was reſolute in doing nothing; he laid a piece of lint upon each wound, bled the young man freely, and in eight days, he was walking in the ſtreets. Here was diſplayed the ſuperior diſcretion and good ſenſe of an old and ſkilful ſurgeon; and, I think I uſe the right word, when I ſay, that La Motte, was reſolute in doing nothing; for had this wound been committed to the ſurgeon, with all his probes, you may gueſs ſhrewdly, that at leaſt, he would not, at the end of eight days, have been in the ſtreets. Your buſineſs then is to obſerve the direction of the ball, to reflect upon its courſe among the viſcera, to calculate for your own private ſatisfaction, which of the viſcera may be wounded; but never be ſo raſh, as to pronounce an opinion on this

uncertain point, either to the wounded man, or to his friends. You observe your patient's condition most anxiously, his breathing, his pulse, the seat of his pain; perhaps also you push your finger slowly and gently into the wound; to examine more into a wound of this nature, and especially, to thrust your probes down into it, were neither humane, nor sensible, and surely were no mark of superior skill in the surgeon, who could think it necessary to do so harsh and hurtful a thing.

But, although in wounds of the belly or breast you need hardly examine the wound, since you cannot follow the ball, you should, in wounds of the limbs, examine accurately, for there much good is to be done; there is a direct motive; there is the hope of finding the ball, and the expectation of cutting it out: This encourages us, in spite of any pain which the patient suffers; for probing is comparatively easy at first. When a man is recently wounded, the parts are deadened, the wound itself is so bruised, that it is, (if I may be allowed to call it so), a hollow gangrene; the wound being as a tube lined with dead parts, feels little at that time; but when it has inflamed, it is swelled, and the finger cannot pass, it is painful, and we dare not persevere. We do not cut a corn when it has inflamed, much less can we tease a gun-shot wound; and besides, the patient in the heat of battle can look coolly upon any bloody operation, which after five days he cannot bear the thought of: Therefore, all probing should be done at the time of the wound. If the patient has lain in the field, or been dragged in

carriages after a retreating army, till his wounds are inflamed, and is received into an hofpital in that condition; he muft be wrapt up in poultices till the efchars have fallen, and till the fwelling be gone; and when the wounds have fuppurated, and come into a foft and eafy condition, we may again probe the wound.

All furgeons prefer the finger to the probe; becaufe a mufket wound will admit the finger eafily, the finger is not apt to catch upon tendons or nerves, it does not endanger the arteries, and by feeling with the finger, we judge moft accurately of the condition of the wound: The finger both directs our operations, and inftructs us in what is to be done. Perhaps we feel the ball, and then we cut directly upon it; perhaps we feel the wound making a crooked or fpiral turn, and we follow it with our incifions; perhaps we are fenfible that it touches a great artery, and in working with our biftoury, we are careful of that artery; we know alfo whether the ball has touched a joint, or broken any bone; accidents, which not only increafe the danger, but which may even incline us in certain circumftances to cut off the limb. In fhort, all that we refolve, is from the information that we have through the finger, and it directs all our operations: The finger is always in wounds of the limbs, but more efpecially in wounds of the vifcera, to be preferred to the probe.

By thefe obfervations, then, you will learn to be prudent and gentle in probing dangerous wounds, as of the breaft and abdomen, and flow in declaring your opinion: But you will be more bold and perfevering in

probing wounds of the limbs; because the wounding of the joint, or the shattering of the bones, may, along with other considerations, incline you to amputate the limb; or the ball having cut the great artery, may be another reason why the limb cannot be saved; and the extracting of the ball itself, or of the broken bones, depends upon your feeling them. Thus, your future operations are regulated by your opinion of the wound, and the first of these operations is the scarification of the wound.

2. OF SCARIFYING AND DILATING GUN-SHOT WOUNDS.

Mr. Hunter reasons thus about the dilating of wounds: "Surgeons first dilated wounds, because of there being foreign bodies in them which it was necessary to extract; and they continue this practice of dilating wounds, although it is very well known that balls remaining in wounds produce so little danger that a modern surgeon would not allow himself to give pain, nor to make a large incision merely for the extracting of the ball;" yet they altered this practice, says Mr. Hunter, "only in so far as respected the attempt to extract extraneous bodies; for when they found from experience, that it was not necessary nor possible to extract these immediately, yet they did not see that it therefore was not necessary to take the previous or leading steps towards it." In short, Mr. Hunter thinks that a useless practice is continued, after the intention of it, *viz.* the extracting of the ball, is no longer ac-

knowledged. But I am persuaded, that were we but to look a little farther back into the history of this practice of dilating wounds, we should find the surgeon driven from one foolish reason to another, in vindication of a practice which he still found necessary, and still could not explain. In short, in this as on many other occasions, the practice continues the same, while the theory changes according to the caprice of the author.

When army surgeons could no longer assign the poisoned nature of the wound as their motive for dilating it, they found themselves still obliged to continue the practice of dilating wounds; and on one memorable occasion, we find the congregated colleges of surgeons and physicians assigning a very curious reason for their practice.

The Baron De Sirot who had been lieutenant-general of the camps and armies of France, under three successive kings, Henry IV. Louis XIII. and Louis XIV. was wounded in the thigh with a musket ball, which broke the bone; and he was a man so much valued, that the Queen gave a particular order for both colleges of surgeons and physicians to consult and advise upon the case. Four members from each college were deputed to examine the case, while the colleges waited each in their own hall to receive the reports. There was no doubt, in a meeting of two colleges some little disagreement: but the majority determined to make incisions "to give air to the wound;" or in plain terms, they found great collections of matter, and they knew by experience that the incisions prevented or al-

layed the ſwelling, by "giving vent or giving air to the wound."

The purpoſes of ſcarifying are, I have told you, to open the veſſels, that they may bleed; to enlarge the wound, that when it inflames, it may have room to ſwell; and your inciſions, while they change in ſome degree, the nature of the wound, enable you to ſee to the bottom, and to take up the bleeding arteries, and to extract the ball, or the fractured bones.

In this firſt ſentence, I have mentioned all the motives for dilating theſe wounds; and you will naturally obſerve, that of theſe motives, a bleeding artery, a broken bone, or foreign bodies lying at the bottom of the wound, belong to the common principles of ſurgery; but that, independently of theſe reaſons, there are direct motives for this particular practice, which I ſhall endeavour to explain in ſuch ſimple terms, as to enable you to draw a plain inference, judging for yourſelves.

The meaning of this expreſſion, of giving vent to the wound, is to be found in the following deſcription of a deep wound in a fleſhy member. Every recent wound, admits the finger of the ſurgeon; but when after a little while, the wound in the ſkin inflames, we cannot puſh in our finger, but with force, and with pain; and when we do force our finger through the ring, or ſtricture of the outward wound, we feel plainly, that all is looſe, ſoft, and eaſy within. This ſtricture, then, or inflamed ring of the ſkin, with a deep wound, which ſwells and inflames, ſhould, when we

are ſenſible of ſuch ſtricture, induce us to open or dilate the mouth of the wound; and it is very ſingular, that army ſurgeons ſhould, with one accord, direct us to open very freely every gun-ſhot wound; while none but thoſe ſurgeons, who have ſeen few gun-ſhot wounds, venture to talk of reducing this piece of ſurgery to the common principles, which regulate our practice in other wounds. Here it is eaſy to ſee, which party we ought to follow, and we muſt continue dilating gun-ſhot wounds, till the army ſurgeons ſhall reject this rule of practice, which they introduced, and ſtill follow, and which they alone are entitled to annul.

Every man is too apt to repreſent his own conceits as the true PRINCIPLES; and whether he is ſettling diſputed points in ſurgery, or debating ſome higher queſtion in ſcience, ſtill this word PRINCIPLE, is apt to be abuſed. But ſurely, it is conſonant with all ſound principles of ſurgery, (at leaſt, in ſo far, as ſurgery is in any degree perfect), that we ſhould open every wound which has bleeding arteries, or broken bones, or where foreign bodies are lodged within it; and moſt eſpecially, it is good ſurgery to open every wound, which is of a tubular form, *i. e.* which is deep and penetrating, with a narrow opening, a tenſe faſcia over it, and an inflamed ſkin, and which muſt itſelf inflame through its whole extent: were this, which we are now treating of, a penetrating wound, inflicted by a ſharp or clean cutting weapon, it might adhere, even by the firſt intention; and we ſhould rather cover the mouth, and preſs together the ſides of ſuch a wound. But gun-ſhot wounds muſt throw off ſloughs, cannot heal

by adhesion, must suppurate, or in other terms inflame; and so we return to the first point, "that it is to make this inevitable inflammation more easy, that we make a small longitudinal incision, so as to widen the mouth of such a wound*."

The second motive for dilating a gun-shot wound at once strengthens the general argument, and teaches us to carry the incision a little deeper than the skin: for since the penetrating gun-shot wound, which passes through the thick flesh of a limb, must inflame through all its course, it is very plain, that while it inflames it swells, and when it swells, the fascia, which only bound the muscles in the just degree before, must straiten and press them. From this straitening proceeds a corded feeling of the wounded limb, a higher inflammation, a crampish pain, convulsive twitchings of the limb, sometimes locked jaw, and sometimes death. From the anxiety with which Ravaton and Le Dran direct us to cut this tense fascia with a large crucial incision, we are sure that they had just such

* Mr. Hunter says, "open or scarify a wound as freely as you may think necessary, I will engage, that it will be, in a month's time, in the same state with a similar wound which has not been opened;" which argument is a very unfortunate one on Mr. Hunter's part; for it proves this plainly, that whatever good such scarifications may do, at least, they will do no harm; they may save the patient from pain, from high inflammation, or from nervous symptoms, such as often follow an inflamed fascia in bleeding of the arm; and that still "the wound will be in a month as nearly heal, as if it had not been opened;" in short, the quick healing of this scarified wound is so particular, as to be observed, even by those who are the most averse from this practice of scarifying wounds.

ideas, and ſuch motives as theſe, for their practice; but thoſe who are harping always upon the old ſtring of principles, ſhall alſo be ſatisfied that this practice belongs fairly to the ſurgery of common wounds, and *a fortiori* in a particular manner to gun-ſhot wounds.

A young woman, a ſervant in the country, had a fall from a cart, and by her elbow lighting upon a ſharp ſtone, ſhe received an angular wound by which the ſkin and the faſcia were torn. This lacerated wound was about a inch in length, and the faſcia at this point of the arm where it is ſtrongeſt, was ſo lacerated, that its ragged edges projected through the wound. There came on a deep coloured inflammation, accompanied with a deep-ſeated dreadful pain of the whole arm: She had reſtleſs nights, fearful dreams, weakening ſweats; ſhe could not move her arm, nor ſuffer it to be moved; her diſtreſs was continually increaſing for ten days, when ſhe ſeemed in great danger of her life. The ſurgeon then ventured to make an inciſion through the ſkin and faſcia two inches long: The faſcia inſtantly flew open; all the dangerous ſymptoms were at once removed; and next day, inſtead of the gleety diſcharge which had hitherto come from the wound, there came good pus, and the whole wound and inciſion healed quickly, leaving only a degree of weakneſs behind. In this, and in ſimilar caſes, the faſcia flies open with an impetus which ſhows its tenſion, and with ſuch inſtant relief of pain, as demonſtrates in a manner the neceſſity and the good effects of the inciſion. The analo-

gy here is very direct and fair; it might be ſtrengthened with numberleſs caſes of the ſame nature, more prolix indeed in their detail, but not more deciſive with regard to the great point at iſſue; and among theſe, there is one caſe which ſtands out very prominent from all the reſt, where the faſcia was four times divided always with perfect relief, but always as the faſcia healed, the contraction of the arm, the ſpaſmodic diſeaſe of the whole ſyſtem, the reſtleſs nights, fearful dreams, pain, fever, and weakneſs returned; till at laſt, by a random ſtroke, rather than by any well conceived deſign of the ſurgeon, the faſcia was fairly cut acroſs at the place where it is braced down by its connection with the long tendon of the Biceps Muſcle, and then only, *viz.* at the fourth inciſion, the patient was entirely relieved. "Now, ſays ſhe, you have indeed cut the cord which bound my arm;" and ſhe toſſed her arm freely, and with great exultation. In ſhort, this is a caſe on which I would inſiſt much; for if I could afford time to detail at full length the circumſtances of it, you would find theſe four ſucceſſive operations to reſemble rather four regular experiments contrived for the very purpoſe of proving how dreadful the diſtreſs ariſing from a tenſe faſcia is, and how ſure the relief is every time that the faſcia is opened, and how ſurely the diſtreſs returns every time that the faſcia is allowed to cloſe; and how perfect the relief is whenever the faſcia is decidedly and fairly cut acroſs. In ſhort, with ſuch analogies before him, no ſurgeon, however averſe from the dilatation of gun-ſhot wounds, can refuſe his

aſſent to this ſecond rule, "that wherever we dilate the mouth of a gun-ſhot wound, the inciſion ſhould paſs through the faſcia, as well as through the ſkin;" and that whenever the ſymptoms of a tight faſcia come on, we ſhould be careful to open the wound anew, and to make the faſcia quite free.

Theſe inciſions are not ſevere; the very purpoſe of them, is to abate inflammation; they are done early when the wound is almoſt inſenſible, the patient feels little pain in the preſent time, and owes to theſe inciſions, much of his future comfort and eaſe; we are particularly well aſſured, that they do not retard the healing of the wound, "which is as far advanced in a month, as if it had not been touched with the knife;" in ſhort, though the wound will often heal without ſcarifying, yet here, as in every other neceſſary operation, the patient has a chance of eſcaping much pain and danger, by ſubmitting in the firſt inſtance, to a trifling pain, attended with no danger, nor any conſequences, but what are good.

Thus, you perceive, that the firſt great point to be eſtabliſhed, is the propriety of ſcarifying thoſe wounds, in which the tenſion of the faſcia, the ſwelling and tenſion of the limb, the confinement of the matter, or the manifeſt conſtriction of the orifice, make it neceſſary to give this relief; and as for the dilatation of thoſe wounds, in which there is a bleeding artery, ſhattered bones, or ſome foreign body remaining within the wound, that is a buſineſs too plain to need argument; and therefore ſuppoſing the principle to be acknowleged, I ſhall next proceed to repreſent the

practice; the subjects, therefore, which remain to be explained, are the intention of counter openings; the use of setons, the extraction of balls, or of splinters of bone, and the way in which we manage the bleedings from gun-shot wounds.

1*st*, A COUNTER OPENING, is the opening which the ball itself makes behind in passing through a limb; or that which the surgeon makes for the extraction of the ball, when it has not passed quite through and through.—The greatest army surgeons, who were also, it should be remembered, the most eminent private surgeons in the greatest cities of the world, have advised us always to make a counter opening, and extract the ball; they order this in the most direct terms, where the ball is near, or directly under the skin. Some of the most famous surgeons advise, that we should extract the ball by a counter opening, even when it has passed only two thirds through the limb. Mr. John Hunter, alone, disapproves of this: He says, that it will raise a high inflammation, passing along the whole canal of the wound. He advises that we refrain from this opening, till we have first healed the gun-shot wound, and then, we may without danger, make our incision to extract the ball. But the answer is plainly this, that the inflammation of a gun-shot wound very seldom runs to any dangerous height, except from a ball bruising the limb, or from broken bones; the anxiety of the patient to have his ball cut out, is so great, that this of itself, is some motive; he may be gratified in this point with no danger, and with little pain: Army surgeons continue this practice, and

unlefs Mr. Hunter had been the greateft army furgeon, as furely he was one of the moft eminent furgeons in private life, his hypothefis, put in competition with their practice, muft not ftand.

But there is alfo another kind of counter opening, which the furgeon is at times obliged to practice; I mean the opening which he muft make in the middle of a long wound, when the track of the wound fwells, or when the abfcefs forms, and the matter, the floughs, and the foul ichor feem to be confined.

For example, a man is wounded by a ball, which breaks one or two of the fingers, pierces the hand, runs up the fore arm, rakes along the bones, and goes out far from its entrance, as at the elbow, or at the fhoulder joint:. Here we can hardly prevent a long fuppuration, and too often, an exfoliation or fpoiling of the bones; and three openings are required, one where the ball entered, another at the counter opening, or that by which the ball paffed out; and if fwelling, pain, irritation, or perhaps nervous fymptoms come on, then there will be required alfo another opening in the middle of the wound. Such an opening will eafe the fwelling, and prevent a fuffocation, (if I may exprefs it fo), of the wound; it will prevent gangrene, bring on a good fuppuration, and allow a free vent for the matter; it will alfo prevent finufes, and fo fave the arm, which from frequent collections of matter along the courfe of a long bone, muft be in fome danger; and there is one good effect of fuch an incifion, that it will fave us from the fevere, or rather cruel practice of the older furgeons, who were ac-

cuſtomed, in ſuch caſes, to run a large ſeton through the tube of the longeſt wound.

2*dly*, The *true uſe of a ſeton*, falls next to be diſcuſſed; for though the indiſcriminate uſe of ſetons muſt be condemned, we muſt acknowledge, certain circumſtances in which they ſhould be uſed; but not as the older ſurgeons uſed them. It is manifeſt, ſay thoſe older ſurgeons, that ſetons will give free admiſſion to our medicines, will preſerve a free drain for the matter, will encourage the ſuppuration, and will ſhake the fractured bones. Now, as for the medicines that are to be introduced, we know of none which can be uſeful; the matter ſurely will make way for itſelf; ſetons will, no doubt, promote ſuppuration, and ſupport it! but they will do ſo juſt in the ſame way, that a ball ſticking at the bottom of the wound, or a piece of the ſoldier's coat or veſt, will encourage ſuppuration, *i. e.* by irritation and pain, attended often with ſo high a ſwelling, that the ſeton muſt be ſuddenly withdrawn.

But when I ſay, that "this ſevere or rather cruel practice," I mean only the running up a ſeton through a freſh wound, where the expectation of its quickening the fall of the ſloughs is no apology for this needleſs pain. In the firſt moment of the wound, it is not unuſual, with a long probe, to draw through the tube of the wound a ſkein of cotton, which, if there be any piece of cloth, or ſplinters of bone, or balls, it will ſometimes entangle them, and draw them out, ſo as to prevent tedious ſuppurations and ſinous ulcers. But there is no motive for keeping the cord

in any recent wound, accompanied with irritation and pain, and a rifing inflammation; this cord is therefore immediately withdrawn; but there is an after-ftage, in which this long wound having become fiftulous, and of a callous hardnefs through its whole length, will not heal.——And this flow cure may be attributed to one or other of thefe two caufes.——— Firft, That the wound having become entirely callous, pours out a profufe gleety difcharge; its veffels permitting their fluids to efcape thus, through mere relaxation, while they are incapable of that degree of inflammatory action by which the wound fhould heal. ——Secondly, That there may remain fome foreign body within the wound: Now a ball never produces thefe fymptoms; a broken and corrupted bone would prefently be known by the black colour and fetid fmell of the difcharge; and if the flow healing of the wound is known to proceed from neither of thefe caufes, then moft likely it arifes from fome piece of cloth which has paffed in along with the ball; and though fometimes we may excite fuch a wound as this, by ftimulant injections, or wafh out any piece of cloth by milder injections of tepid water; yet clearly the beft way of exciting a healthy action in fuch a fiftulous fore, or of entangling any foreign body, is to run a feton through the wound, to draw it for a few days; if in that time, it either does harm, or does no good, let it be withdrawn; and if the wound be truly callous, and really requires this harfh treatment, it will alfo be able to bear it without either danger or pain*.

* However ufeful, or rather allowable, fetons may be in flefh,

3. OF THE EXTRACTION OF BALLS, CLOTH, OR SPLINTERS OF BONE.

THE endeavours which you make for extracting the ball, muſt be infinitely varied, according to the circumſtances of the caſe; and there can be given hardly any more ſpecific direction than this one, to uſe your finger more than forceps, and to get the ball out, rather by making free inciſions, ſo as to touch it, than by painful and ineffectual gropings in a deep and narrow wound; for forceps are not quite ſafe, and ſcrews are very dangerous, and not to be uſed: You muſt have crow's bill and crane's bill forceps of various forms; and often by pointing with the finger, you can make them touch the ball, before opening them to graſp it; but you muſt not uſe thoſe fooliſh ſcrews, called TIRE-BALLS, which are only to be paſſed deep into the wound, where the finger cannot go to guide them; and which, you may be aſſured, are as likely to be fixed into the bone as into the ball, although no doubt the ball is generally flattened by ſtriking the bone. As for the DILATORS, they belong to the armoury of the old ſurgeons; for they were uſed for dilating, or to ſpeak plainly, for tearing the wounds open, in the times before Parée, when not being able to take up an artery, the ſur-

wounds, I cannot think them prudent or harmleſs, in caſes where there are broken bones or a wounded joint; for there the inflammation is apt to run too high, and the ſuppurations are but too profuſe; and I proteſt, abſolutely, againſt the ſetons being run acroſs the cavities of the thorax or abdomen; yet it is in ſuch caſes, chiefly that tents and ſetons have been uſed; and therefore I ſhall need to take up this queſtion again, when ſpeaking of wounds in the breaſt.

geons never dilated with the knife, nor ever uſed the knife, even upon the moſt neceſſary occaſions, but with fear and trembling, and with their cauterizing irons ready to ſear the arteries with, before any operation was begun.

If a ball have paſſed quite through a limb, it is well; if it have paſſed nearly through, but ſtopt at the ſkin, (which is very tough), then the counter opening takes it out; if the ball has paſſed more than two thirds through the limb, it will ſtill be eaſier to take it out by a counter opening, than to ſeek for it with forceps at ſo great a depth; or rather, perhaps, it ſhould be left. If a ball be ſtopt by a bone, it may have ſpent its force, and may have been flattened ſlightly without breaking much of the bone; then it is to be got away with inciſions, and the finger or forceps: But if a ball well charged, and fired from a moderate diſtance, hit upon a bone, it will go directly through, ſhiver the bone and break it acroſs; then the ball and ſplinters are to be diligently taken away, and it is to be treated as a fractured limb of the moſt dangerous kind; but if a ball in the ſame circumſtance, hit any broad and ſpongy part, as the head of the tibia or the condyles of the thigh-bone, it enters into the bone, and ſticks there. The ball cannot remain there, without cauſing a caries of the bone; it cannot be eaſily extracted, for it is flattened and nitched into the ſhattered bone; then there muſt be a free inciſion made, and the trepan applied; or if it be a narrow and firm bone, M. de la Faye orders us to cut the

bone both above and below, ſo as to cut away that piece in which the ball is fixed.

But ſtill let it be remembered, that it is only the openneſs of the wound, and the nearneſs of the ball, that tempts us to ſearch for it; for a ball ſometimes works its way outwards through the cellular ſubſtance, and comes to the ſurface with little pain, or often it lies without danger buried in the fleſh, for years, or for life. If there were no other occaſion for opening the wound, we ſhould never give the patient pain on account of the ball, ſince it ſeldom itſelf gives him pain. It is chiefly, I ſay, the openneſs of the wound, the nearneſs of the ball to the ſurface, and the anxiety of the patient about it, that tempt us to ſearch for it or to cut it out. It is chiefly on account of broken bones, or a wounded artery, that we are to enlarge or dilate the wound *.

* There is this difference betwixt ſcarifying and dilating the wounds, that ſcarifying is that ſuperficial inciſion of the mouth of the wound by which we relieve the tenſion of the faſcia, or the ſtricture of the ſkin; but *dilating* is that deeper inciſion, which we make by puſhing our finger deep, and to the bottom of the wound, following it with the biſtoury, to make a free way for getting at the bleeding artery, or extracting the fractured bone. (*e. g.*) If there be a muſket wound acroſs the fleſhy part of the thigh, we *ſcarify* both the openings; but if there be a ſhot paſſing through the thick part of the foot, we *dilate* the wounds largely upon each ſide, cut away the ragged tendons, and ſo have free openings for the ſuppuration and ſloughing, and for the many fragments of the Tarſal bones which muſt come away.—In ſlighter wounds where the ball does not penetrate a fleſhy part, as the thigh, where no bone is broken, nor no artery wounded; we refrain from all kind of ſurgery, and merely apply a piece of dry lint to the wound.

If there be a cruſhing of the bone and many ſplinters, you will naturally try to get away thoſe which are looſe; be diligent in removing them with your fingers, or in picking with your lever, or even in pulling them out with your ball forceps. But there is a certain point at which your diſcretion muſt ſtop you; though the ſplinters are looſe and ſeem to be loſt, yet they are ſtill attached by their membranes, and may live and may be taken into the knot of callus which reunites the bone. You never know what pieces are entirely uſeleſs, and you ſhould never be violent in tearing up the larger pieces; and as for the ſmaller ſplinters, they never are ſo looſe as to be waſhed away. The injections which many throw into the wounds, are very fooliſh in the opinion of the great Hildanus, who illuſtrates his objection by a very humble ſimile: "Let the ſervant-maid, ſays he, waſh the piece of meat which ſhe has in her hand ever ſo carefully, yet after all her care, and after thorough boiling, the ſplinters of bone will adhere." Therefore, it is the advice of the oldeſt and moſt reſpectable ſurgeons, to leave them to be looſened by ſuppuration, rather than to tear them up with the forceps.

I ſhall conclude this head, by remarking to you how diſtreſſing it is when foreign bodies are neglected, and remain in the wound.

If any foreign body remain in a wound, the conſequence is, that the cure which goes on in a promiſing way for ſome time, ſtops all at once; the wound which looked freſh, and was ſuppurating well, turns pale and flabby, diſcharges a thin ſerum, and begins to diſorder

the whole ſyſtem: for preſently an evening fever and a weakening diarrhœa ſucceed; or perhaps the wound ſeems actually healed, but it is not ſound within; the action of the muſcles forces the ſurrounding parts to preſs upon the foreign body, and accordingly the ſurrounding parts inflame, ſuppurate, form an abſceſs; the abſceſs burſts, and diſcharges much ill-ſmelling matter, but yet the piece of cloth or ſplinter of bone is not diſcharged; and thus the wound ſuppurates and burſts from month to month, keeping the patient in ſome danger and much diſtreſs.

A cannoneer on one of the redoubts of La Hogue, was firing upon ſome Engliſh frigates; the gun burſt, and he was wounded in the thigh, by one ſmall ſplinter only. La Motte, who was ſurgeon to that line of batteries and entrenchments, was ordered by the commander to dreſs the gunner; but the young man having a ſurgeon who was his brother-in-law, could not but think himſelf ſafer in his hands; for three weeks, his wound was getting worſe daily, and he was weakened by frequent hæmorrhages, which his brother-in-law, and thoſe who aſſiſted him, could neither account for nor manage. The commander once more, ordered La Motte to attend to the gunner, who was a very fine fellow: La Motte ſearched the wound in two or three places with his finger: at laſt, he found one opening particularly deep, which they had never probed, and puſhing his finger to the bottom of it, he felt a ſmall ſplinter of the gun, no bigger than an almond *,

* Obſerve, that an angular ſplinter of an iron or braſs gun, is very different from a leaden ball, which might have lain quite eaſy, the wound healing over it.

lying betwixt the thigh-bone and the great artery, which he felt beating; this was the caufe of all the diftrefs, and after it was extracted, the patient never had a bad fymptom, but was cured of this very deep wound in three weeks *.

In the fame way, Ravaton had tried to cure a young man, a Captain of foot, but in vain, while the foreign bodies remained. When this officer came firft under Ravaton's care, he had a large wound in the top of the thigh, from which Ravaton had, at the time of the wound, extracted a mufket ball; he continued under Mr. Ravaton, growing worfe and worfe daily, for three months, during all which time he had continual pain, and frequent diarrhœas, by which he was extremely wafted: His pain was dreadful, and he had fuch inflammation, and abfceffes in the thigh, as occafioned Mr. Ravaton to make five openings with his lancet, on account of collections of matter: At laft, after a night of very great pain, there burft out a flood of confined matter, from the wound in the thigh. Mr. Ravaton introducing his probe into this cavity, felt a foreign body at the bottom of it, and enlarging it a little, he put in his hand (for the fore was now large enough to admit his hand), into the thigh, and thence he drew out a fmall copper key, the key of his efcrutoire; three fmall pieces of a filver feal; and no lefs than thirteen very fmall fragments of the carnelian ftone belonging to the feal.

* La Motte.—Vol. IV. p. 184.

4. OF THE BLEEDING FROM GUN-SHOT WOUNDS.

THE bleeding from gun-ſhot wounds remains to be explained; and I need not tell you, that wherever there is bleeding from a gun-ſhot wound, it muſt be a deſperate bleeding, from which your patient can be ſaved only by the greateſt boldneſs and judgment on your part. It muſt be a dreadful bleeding; becauſe it is againſt the nature of gun-ſhot wounds to bleed; their bleeding is a ſign of ſome great artery being cut; and judgment is as much needed as boldneſs; becauſe, in this caſe, even the patient's lying eaſy for ten days is no ſecurity againſt bleeding; and your anatomical ſkill is ſhown by your knowing when the ball has bruſhed cloſe by a great artery, and, by that, and by other marks, whether a profuſe bleeding is really dangerous.

Since there is naturally no bleeding from gun-ſhot wounds, to find much blood ſpouting from a wound, is extremely alarming; nothing is more likely than that ſome great veſſel is cut; and whether it be the thigh, or ham, or arm, that is wounded, although we will not allow ourſelves to do any thing raſh, we muſt inſtantly make bold inciſions, guided by the finger, until we ſee the bleeding artery, and tie it up. It has been an axiom of ſurgery, ever ſince Parée's invention of the needle, that we may ſtem a hæmorrhage either by ſtyptics, or by compreſſion, or by tying the artery; but in this caſe, there is hardly that choice. If we truſt to ſtyptics, what will become of our patient, who is hurried from the battle, into a cart, and driven along the rougheſt roads,

from poſt to poſt; and, until he arrives at the General Hoſpital, never has a ſurgeon at hand to ſtop the blood? If we intend compreſſion, and ſo cram the wound with lint, then a firm bandage is required, and either the bandage is ſlackened during this dangerous journey, or the poor ſoldier finds it drawn ſo tight, as to occaſion dreadful pain, and arrives at ſome General Hoſpital, with his limb ſwelled to ſuch a degree, that either it is gangrenous already, or is inclined to run into gangrene. For theſe reaſons, arteries wounded in the field of battle, never can be truſted with a compreſs; in ſuch circumſtances, nothing is ſecure, but a free inciſion, and a fair tying with the needle; and it is indeed remarkable, that none but the army-ſurgeons underſtood the value of the needle, when it firſt came into uſe. "I condemn, ſays Le Dran, that ſort of compreſſion, which is made by cramming the wound with dry lint:" indeed we may ſay, with ſtrict propriety, it only conceals the danger; it ſuppreſſes the bleeding for a time, to break out more furiouſly, when we are leaſt prepared; it ſmothers, but does not extinguiſh the fire.

But the ſecondary hæmorrhage is ſtill more to be feared, as the hidden danger is always greater than the open danger; for, as I have ſaid, "the patient's lying eaſy even for ten days, is no ſecurity that in the end he ſhall not bleed to death." Every circumſtance concurs to lull us into a fatal ſecurity; the patient lies eaſy, and tolerably free from pain; there is no fever, there has been no bleeding; even at the firſt the wound was ſcarcely ſtained with blood; on

the eighth day, the eschar of mortified and bruiſed parts begins to looſen; on the ninth or tenth day, the ſloughs begin to fall; and if this partial gangrene has touched the coats of a great artery, the ſloughing of theſe coats leaves a breach in its ſide; the blood burſts out impetuouſly, and it is not that the patient may die of a ſort of ſlow bleeding, betwixt night and morning, but he dies in a moment. Ranby tells us, that by ſuch bleedings, he had ſeen a man die, who had loſt no more than twelve ounces of blood; the loſs indeed is ſmall, and ſuch a ſudden death may be mentioned as ſurpriſing; but it is not unnatural, when ſuch a quantity burſts out from a great veſſel, and is ſo ſuddenly poured out, that the balance of the ſyſtem, and that reſiſtance which keeps up the excitement of the heart and of all the arteries, ſhould be loſt in a moment, and the man die. Surely the knowing of ſuch things as this, muſt be a cauſe of great anxiety, and a motive for continual watchfulneſs to the ſurgeon. The watching is a kind of duty which no ſingle man can fulfil; but mates and pupils ſhould be appointed to watch, who can anſwer for the event; and thoſe patients who have wounds near the greater arteries, ſhould ſleep with tourniquets round their limbs, ready to be ſcrewed.

But whether it be an immediate, or a ſecondary bleeding, the conſequences are of the moſt ſerious nature: For, firſt, There is the preſent danger of immediate death, from the bleeding: Secondly, There is another danger, viz. of aneuriſms, formed by the open arteries, that is, of great ſacs of blood, formed near the

wound, which may require a tedious diffection, for emptying the bag, and for tying up the wounded veffel: Thirdly, If the arteries continue open, and burfting out from time to time, then every burfting out of the arteries, will both endanger the patient by the open lofs of blood, and will cram the leg with inward bleeding; fo that the extravafated blood will fill the interftices of the mufcles; produce foul fuppurations, and gangrenous floughs; and will in the end, caufe a corruption of the bones; fo that it were better for a man to lofe his leg at once, than to be thus long in mifery, with fo poor a chance of faving it.

Perhaps, the beft general rule will refult from my explaining to you, once more, in a few words, the intentions and motives for dilating gun-fhot wounds; many flighter wounds do not require to be fcarified; and where we do fcarify, or rather dilate a gun-fhot wound, it is in proportion to the fize of the limb, the deepnefs of the wound, the fmallnefs of the openings, or their diftance from each other; we open or dilate, quite to the bottom, every great wound in which any great artery bleeds, or in which there are many great fragments of fhattered bones. The ball itfelf is the only foreign body, about which we are lefs careful, fince it is often lodged among the mufcles, makes a fac for itfelf, excites no pain, and lies there harmlefs, exciting no inflammation nor pain, for years, or perhaps for life. And when the time arrives, in which the wound fhould heal, but does not heal, we pafs through every fuch callous fore, a fkein of feton,

especially if we suspect that any piece of the cloths carried in by the ball has been left behind.

Thus you see that this dilating or scarifying is the chief point in the treatment of a gun-shot wound; and you will also observe, that the wounded artery absolutely requires this dilatation; the fractured bone also requires it; the flesh wound needs it less. The wound across the cavities, as across the breast, hardly needs, or indeed allows of this dilating; for there is no part which is tense, or which needs to slough, except the skin, and outward wound; and all the rest is, as Mr. Pouteau says of the wounded bladder, " like a stroke in the water:" Thus there is no tension, no swelling, no continued sloughing; in this, the deepest wound, there is no depth of wound: the outward wounds indeed must throw off a superficial eschar, but all the inward wounds of the pleura and lungs seem to adhere; and we are often surprised with a very sudden, and very happy cure.

By all this it will appear to you, that the motives for scarifying gun-shot wounds, are just such as you would acknowledge, in the treatment of common wounds; that the principles being once taught to the young surgeon, all the rest must be left to his discretion and good sense: That these motives are sometimes urgent, sometimes trifling; and that this scarification or dilatation must be boldly done, or partially done, or quite neglected, according to the exigencies of the case.

THE TANJORE MAHARAJA SERFOJI'S SARASWATI MAHAL.

DISCOURSE VII.

OF WOUNDS WITH THE SWORD OR BAYONET, OR ANY CLEAN CUTTING WEAPON.

I AM now to keep my promiſe, of collecting the minutiæ and details of practice, into a few general rules; which will give a more regular concluſion to a diſtracting and intricate ſubject. The ſpeculations on gunſhot wounds are of very little importance in the eye of the modern ſurgeon; that gun-ſhot wounds are poiſoned, is not at the preſent day, a matter of debate; but it is known that they are juſt as difficult to heal, as if burnt or poiſoned, and of this difficulty, even the outward appearance of the wound gives the ſtrongeſt indications.

1ſt, In wounds of the viſcera, you are not to introduce your probe with that unfeeling boldneſs, which makes every repetition of the practice, a freſh ſtab; uſe your finger only; uſe that, too, ſparingly; truſt rather to the eye; look to the general condition of the patient, and the courſe of the ball; wait quietly for the ſymptoms, and be guided by them.

2dly, Probe with greater freedom and boldneſs in wounds of the limbs, and ſearch carefully for the ball, or cloth, or ſplinters of bone; for your future operations are ſucceſsful, only in proportion as the condition of the wound is well underſtood.——But if the patient have lain long upon the field, or have been carried in a wagon; if from any cauſe his wound be already inflamed, you muſt refrain from ſearching; for it is too late to extract the ball, and you muſt wait (laying the limb eaſy) till the ſuppuration be formed.

3dly, The common term, "ſcarifying of gun-ſhot wounds," is an unlucky one; for we uſe a word which implies but a ſuperficial cutting, to explain what it never can explain, a deep and bold inciſion, for extracting broken bones, or for tying wounded arteries; which muſt be made large, in proportion to the ſize of the limb, not ſuperficial in the ſkin only, but alſo into the faſcia which binds the muſcles; ſometimes it muſt go down alſo among the muſcular fleſh. This unlucky word, ſcarifying the wound, and the ſenſe in which young ſurgeons have underſtood it, and the making of ſuperficial inciſions, which can never be uſeful, and of ſcarifying indifferently all kinds of wounds, has been the occaſion of ſo much doubt concerning the propriety of dilating wounds. There may be required three inciſions in a long wound; there muſt be two in every wound which paſſes through a member; there muſt be a wider inciſion where the ball is loſt in the limb; and this ſingle inciſion ſhould be ſo freely made, as to change the wound from one penetrating and wide at the bottom, to a wound quite open

and much larger at its mouth; or, in plain terms, it is in proportion to its deepneſs, that we open the mouth of a wound.

4thly, If there be bleeding from a gun-ſhot wound, you are ſure that it is no common bleeding, that it comes, not from the ſmaller arteries, which are too much bruiſed to bleed, but from ſome great veſſel, which you dare not for a moment neglect: You muſt apply your tourniquet, make bold inciſions, and look fairly down into the bottom of the wound, that you may apply your ligature ſurely; and ſince a gun-ſhot wound is in general bloodleſs, the want of bleeding is no ſecurity that no great artery is hurt; for if the ball has bruſhed by the ſide of the Femoral or Tibial arteries, an eſchar will fall off from the artery, as from the other bruiſed parts, and there will be a breach in its ſide: Therefore, whenever a great artery is hurt, you muſt take meaſures not to be ſurpriſed; if, in putting in your finger, you have felt the beating of ſuch an artery from the wound, you muſt watch with care from the fifth, to the fifteenth day; watch always, while the ſloughs are falling off; and a beating or throbbing in the wounded limb will often forewarn you of the danger.

5thly, Inſtead of uſing ſetons or tents to keep the wound open, you ſhould ſeek relief from free inciſions; and, inſtead of hot and ſpirituous applications, (which uſed to be put to thoſe wounds, when they were thought to be poiſoned, the lips looking gangrenous or livid), lay the wounded limb in large poultices, eaſy and ſoft, which will at once encourage a

kindly ſuppuration, and aſſuage the pain; but as ſoon the pain is abated, and the ſuppuration eſtabliſhed, and the ſloughs beginning to be diſcharged, the poultice muſt be removed, for the continued uſe of it will but increaſe the relaxation, the fetor, and the profuſe diſcharge.

6thly You will ſee that there is no dreſſing peculiar to gun-ſhot wounds; that they are peculiar, rather, in admitting of none. The French ſurgeons uſed to employ themſelves and their attendants in rolling long bandages with curious neatneſs, and intricate reverſes and turnings, which, though they might keep up the parade of ſurgery, occaſioned ſo much pain to the patients, that they were ridiculed even in the French Academy, and by their own great ſurgeon Le Dran. There are now none of theſe bandages uſed, which you ſee ſo finically drawn in books; no ſetons are drawn through the wounds loaded with medicines, always of doubtful, ſometimes of a very miſchievous and irritating nature; no ſpirituous applications, which might be conſidered us the real poiſons, nor any burning with cauſtics or oils, which indeed they uſed hot enough to melt the very ball with which the wound was ſuppoſed to be burnt; we do nothing now but wrap the limb in a large, ſoft, warm, and comfortable, oily poultice; in ſhort, we in Scotland call a poultice a bath; and if you will make every poultice, literally, a bath for the limb, you will do your patient great juſtice; poultices, in the firſt inflammatory ſtage, are the propereſt applications; ſetons at ſuch a time are irritating and dangerous;

the old apology for ufing them, *viz.* the bringing out the floughs, is a very abfurd one: Setons, injections, and bandages are never to be ufed till the wound have degenerated into a fiftulous fore.

Thefe rules reprefent to you now, at once, both the peculiar nature of gun-fhot wounds, and the intention and manner of treating them; of fearching wounds, of enlarging them; of fecuring arteries, and of extracting balls; and I am very fure, that I have been fo orderly, that I can neither have omitted, nor flighted any rule of real importance. But befides this, an army furgeon muft underftand the nature of other wounds; and indeed, upon comparing gun-fhot wounds with cuts of a fabre, ftabs of the bayonet, or thrufts of the fmall-fword, we find them differing in all the effential points; they are not bruifed nor gangrenous; not dangerous from after bleeding, nor tedious from cafting off floughs; there are no motives for fcarifying; nor are there any painful extractions of foreign bodies; no flow exfoliations, nor irregular fuppurations, nor new abfceffes appearing juft when the wound fhould heal. But, on the contrary, fabre wounds are eafily reunited, like the flaps made by the furgeon's knife; and even bayonet wounds among the vifcera are fo very different from gun-fhot wounds, that when the firft dangers are over, we pronounce the patient fafe; nay, I fhall have occafion to explain to you, upon rational principles, fome recoveries from bayonet wounds, which look more as if they had been owing to the art of magic, than regular furgery; recoveries of men whofe breafts had

been fairly transfixed with the weapon, and the wound managed in so peculiar a manner, that they have been walking in the streets, sound and well, in a few days.

' Here then you enter upon a new line of practice; forsake entirely the probings and incisions of gun-shot wounds, expecting to perform the cure upon easier terms. For when there is a fair cut, put it together, and it will heal; when there is a large flap made by a sabre, put it down as confidently as if you had made it in some regular operation, and it will adhere: even when there is a penetrating wound, far from opening it with incisions, close it with a compress, and put its sides together by a rolled bandage; and if there be no open artery to fill it with blood, even this penetrating wound will close, and be obliterated in a few days.

These are simple facts, proved by every day's experience; upon the rules therefore resulting from them we can rely; but they are so unlike all the principles and practices which I have recommended hitherto in penetrating wounds, that I find the simple enunciation of them will not be sufficient: It is necessary then, that each of these three rules should be expanded by representing the accidents of real practice.

I. The first rule is, That where there is a fair cut, or even a flap of the largest size, put the wound together, or lay down the flap, and it will adhere.

When a sabre cut upon the head flaps down the scalp, and lays bare the scull, too often such a flap is

CUT AWAY, and the bone ſpoils; and not ſeldom, after ſuch imprudence on the part of the ſurgeon, the brain is affected with the inflammation, and the patient dies. But if the weapon have touched the ſcull itſelf, and if but a ſmall piece of the outer table only be razed, then, without any motive, and againſt all rules of good ſurgery, the ſurgeon very often applies the trepan. Here there is no motive for applying the trepan, for there is merely a clean cut paſſing ſidelong through the ſcull, ſo that there is no heavy blow ſuch as might hurt the brain; there will moſt likely be no extravaſated blood; very often the patient rides into the camp, and comes himſelf to be dreſſed to his ſurgeon's tent. I do not ſay that in ſuch caſe there can be no danger, the brain may certainly inflame; but at the time of ſuch a wound there is neither inflammation of the brain, nor any actual wound of it; and the moſt effectual way of preventing every danger is, to put down the flap immediately, and cover up the wound. If there be any real danger, ſuppuration will come on, and the flap will never adhere; but if there be no danger, the flap, even though laid upon the naked brain, will adhere as in a common wound; therefore, either after cutting away the piece of bone, the flap may be laid down, or the piece of bone ſtill ſticking ſoundly to the flap, may alſo be preſerved, and laid down along with the flap; and being a living part, and having its circulating veſſels, will adhere.

This is a fact of ſome importance; it has been but little obſerved till of late years: It was thought to be a new diſcovery, when Mr. Meinors, a ſurgeon, publiſh-

ed, in a periodical paper, that he had laid down the ſcalp, and made it adhere, after a great operation of trepan. But Mr. Meinors, like many young ſurgeons, has been too little employed in ſtudying the older ones, and has, like too many inventors of old diſcoveries, ſpoken vainly of a practice which is two hundred years old; for Berengarius Carpenſis, an old Italian ſurgeon, not only knew how to ſave the ſcalp, but he knew alſo that we might very ſafely lay down a piece of the ſcull itſelf, provided only the cut was clean. He tells us of a ſoldier, who was ſo wounded, I believe with a halbert, that the greater part of the frontal bone was cut quite down to the orbit; the frontal bone was ſtill connected with its ſkin, and the ſkin and the bone together hung down flapping over the eyes. My father, ſays Berengarius, being called, cut the bone away from the ſcalp, laid the ſkin up again upon the forehead, ſewed it in its place, covered the ſtitches and the wound with whites of eggs, it adhered, and after ten days dreſſing, the cure was perfect, and the pulſations of the brain were felt where the bone was loſt. He confirms this practice by other caſes, in which he had ventured alſo to put down the bone. Le Dran gives the ſame direction for ſabre wounds; and Parée tells us, that a captain was ſo cut with a ſabre in the parietal bone, that the dura mater was expoſed, beating, and the bone was cut ſo cleanly, that it was turned back over the face, remaining attached only to the flap of ſkin. Three fingers breadth of the bone was thus cut up, and Parée was about to cut it away, when, recollecting Hippocrates's rule, of never expoſing the

dura mater, he put it back into its place, ſewed it there with three points of the needle, and made a perfect cure.

The difference between gun-ſhot wounds and the clean cut of the ſabre is ſo great, that while a touch upon the head, by the grazing of an oblique ball, is very commonly fatal, it often happens that a ſoldier eſcapes, whoſe head has been ſo cut with the ſabre as to loſe the bone and ſcalp, and even a part of the dura mater, with a wound, even of the brain itſelf, which requires many months to cure. In theſe curious facts I ſhould like to inſtruct you more fully, by comparing ſuch intereſting caſes with each other; but I muſt rather paſs on to obſerve one thing more concerning fleſh-wounds, which is not leſs intereſting, viz. That a man may be ſtabbed with a hundred fleſh-wounds, without being in danger.

Habicot, in his diſſertation upon the operation of bronchotomy, tells us, that he once had a young man brought to him, who had been ſtabbed by robbers with no leſs than twenty wounds in the breaſt, throat, limbs, and private parts, ſo that his firſt ſurgeons had left him for dead. Habicot carried him into his ſurgical ſchool, where he continued with his pupils, from ſeven at night till one in the morning, dreſſing all his wounds. One in the throat was ſo deſperate, that he was obliged to perform bronchotomy; and yet the young man was ſafe, and in three months was quite reſtored.

II. THE ſecond general rule is, That, as far as it can be accompliſhed, it is your duty, in a penetrat-

ing wound with the ſword or bayonet, to bring it into a condition in which its ſides may adhere; that is, to cleanſe it of its blood, to cloſe the wound, (but not till it have ceaſed bleeding), to lay its ſides together with a tight bandage, and to cloſe its mouth with a ſlight compreſs.

The difference betwixt a gun-ſhot wound and that made by a bayonet or ſword will be beſt underſtood by attending to an individual caſe; a wound, for example, of the fore arm. If a ball paſs along the fore arm, entering at the wriſt and going out at the elbow, raking along the bones; in a bruiſed wound of ſuch a length, it is the rule, you know, to make no leſs than three inciſions, one at the entrance of the ball, one at the place where the ball goes out, and one ſomewhere in the courſe of the wound, theſe are neceſſary to prevent collections of matter; the wounds need to be kept thoroughly open, and ſtill the whole canal of the wound heals with difficulty, and we are never out of fear of arteries burſting out along with the eſchars, nor of new collections of matter; and very often the bones are ſo ſpoiled by collections of matter that the fore arm is loſt: this is the nature of a gun-ſhot wound. But ſuppoſe a young man, in fighting a duel with the ſword, to be wounded in the ſword-arm: His antagoniſt's weapon goes in at the wriſt and out at the elbow; if in ſuch caſe any great artery be wounded, then indeed it injects the arm with its blood, forming a proper aneuriſm, ſo that we are forced to cut up the fore arm, and tie the wounded artery: but if it be merely a fleſh-wound, it is no

doubt ſomewhat dangerous from being deep and penetrating; but ſtill it is ſo little different from a common and open wound, that could we bring the ſides of this tube-like wound fairly into contact with each other, it would cloſe in a day, juſt as the lips of a common wound adhere in a day; and the reaſon that it it does not happen ſo is plainly this, that the blood which exudes from the very ſmalleſt arteries is ſufficient to fill the tube of the wound: it not only fills it, but the bleeding going on within ſide, while it is prevented by a compreſs and a cloſe bandage from getting out, the tube of the wound is not only filled, but dilated with blood: and, therefore, you are ſenſible; cannot adhere. It does not adhere, juſt for the ſame reaſon (as I have obſerved) the healing of an ill-amputated ſtump, is delayed where the arteries not being fairly tied, have bled after the dreſſing ſo as to fill the baſin of the ſtump, and ſeparate the flaps from each other, and not only prevent adheſion and bring on ſuppuration, but produce (from the grumous blood) a gangrenous ſtump filled with foul and ſtinking matter, partly purulent, partly conſiſting of blood.

Perhaps you will ſay, Why ſhould we not, in a deep wound, ſuck out this blood, and then tie up the wound cloſe? Now this is the very point; and what we ſhould ſuppoſe beforehand would be uſeful, has really been done with great ſucceſs. You need not be told, that there are many romantic ſtories of friends having ſucked the wounded among the ancient warriors, and having reſtored them to health. Perhaps you may

not know, that this operation of fucking wounds is fo much ufed in eaftern countries as to have become a regular profeffion. Nay, in a country not fo far off, in France, it was the cuftom to cure wounds by fuction, infomuch that there alfo it became a trade. Certain people in a regiment, for example, or in a village, were famous for their fkill in fucking wounds, performing wonders, and confounding the regular furgeons, and obliging them at the fame time to confefs the efficacy of this treatment; fo that when two foldiers went out to decide a quarrel with the fword, they carried a fucker with them, who in cafes of flefh-wounds, and frequently alfo in feverer wounds, performed his function with fuch wonderful effect, that very commonly the foldier was able to walk home and do his duty, and the affair was entirely concealed.

Were this thing merely curious I fhould drop it here: but it is a fact both fo little known, and fo ufeful and well authenticated, that I muft explain it to you: for although it may not be a rule nor practice for your imitation, yet at leaft it explains and eftablifhes a principle, the knowledge of which may be of real ufe, viz. That blood extravafated within the cavity of a wound prevents adhefion, while the fucking out of the blood rendered the cure quick and eafy.

This kind of cure was called the *fecret dreffing*, either becaufe the young men who were wounded in duels were by it enabled to conceal their wounds, or rather, perhaps, becaufe being performed with fome ceremonies which were difagreeable to the priefts, they refufed abfolution or extreme unction to thofe who had

ſubmitted themſelves to the ſecret dreſſing; and for that cauſe alſo it was concealed.

The ſuckers, to keep their profeſſion to themſelves, pretended to make it a magical ceremony; they muttered words through their teeth, made ſome ſtrange motions, and then drew the ſign of the croſs. It was from this profanation that there aroſe a hot war betwixt them and the prieſts: the prieſts refuſed extreme unction or any ſacrament, to thoſe who had undergone theſe magical or diabolical ceremonies; while the ſuckers, on the other hand, refuſed to ſuck thoſe who ſhould have any commerce with the prieſts, pretending that the Chriſtian rites of the ſacrament or extreme unction interfered with their incantations: though, after all, this ſucking buſineſs was very ſimple, very uſeful, and ſo entirely natural in its effects, that they can be very eaſily explained.

The ſucker was preſent at every duel; the rencounter ended the inſtant that one of the combatants received a wound; the ſucker immediately applied himſelf to ſuck the wound, and continued ſucking and diſcharging the blood till the wound ceaſed to bleed, and then the wound being clean, he applied a piece of chewed paper upon the mouth of the wound, tied up the limb with a tight bandage, and the patient walked home.

They ſucked till the blood ceaſed to flow; none was left in the wound to prevent the ſides of it adhering: Their function thus emptied the veſſels, cleanſed the wound, brought the blood towards the wounded part, produced, like the application of a cupping glaſs, a

gentle and eaſy ſwelling, which brought the ſides of this tube-like wound ſo fairly together as to make them adhere; they healed as if by a charm, while in truth their healing ſo, was a moſt natural conſequence of this pleaſant treatment. But however promiſing this may appear in theory, it is ſtill neceſſary that it ſhould be proved by experience to have been really ſucceſsful; and no authority can ſpeak more convincingly to this point than the caſes which La Motte has recorded, who was himſelf an eye-witneſs of many wonderful cures, "ſuch as are incredible," ſays La Motte, "to thoſe to whom I relate them; and yet I need not be ſurpriſed at this incredulity, ſince they are cures which I could not have believed myſelf, unleſs I had actually ſeen the thing done." In ſhort, La Motte had ſeen the wounds of ſwords paſſing quite acroſs the breaſt or belly, had ſeen the ſcars of theſe wounds, and had the faithful teſtimony of theſe ſecret combatants; but he would believe nothing, unleſs he were allowed to put his finger into the wound.

I never doubted, ſays La Motte, that this ſecret dreſſing might cure a fleſh-wound of the arm, for example; but that the ſuckers ſhould cure in this way a thruſt through the breaſt or belly, ſeemed very ſtrange; till one day I was called to attend a young fellow, a common ſoldier, who had been run through the breaſt with a fair lounge, in at the pap and out at the ſhoulder. After having examined the wound, and noticed the length of his antagoniſt's ſword, being well ſatisfied that the weapon had pierced the lungs, and gone quite acroſs the breaſt; I ſaw the drummer of the regiment,

(who was the ſucker on this occaſion), do his buſineſs; he firſt ſucked one wound, then, turning his patient over, he ſucked next the opoſite wound; he then applied a piece of chewed paper upon each, and next day the ſoldier was ſeen walking in the ſtreets.

After this La Motte ſaw a man of better condition ſucked with the ſame ſucceſs. He was the Brigadier of a horſe-regiment, who had been wounded quite acroſs the lungs, but without any material harm to the lungs, or great veſſels. Thus, ſays La Motte, is this way of ſucking wonderfully ſucceſsful; and would always, I am perſuaded, be ſo, did the ſuckers but limit themſelves to the right caſes of ſimple wounds of the limbs, or even of the breaſt; but they ſuck indiſcriminately every wound, and wherever there is extravaſated blood, as in the thorax, oppreſſing the lungs, they muſt be unſucceſsful.

Wounds therefore of the ſword or bayonet, in the arm or thigh, may be cured by ſuction, and by putting their ſides in cloſe contact; and whether this be an old practice, or an odd one, unlike the buſineſs of a regular ſurgeon, is not the queſtion; but if it be uſeful, that is the main point; and it is here proved that it is uſeful, not only in fleſh wounds of the limbs, but in wounds acroſs the cavities, where there is no great veſſel, nor any of the viſcera wounded, and where there is no extravaſation of blood.

However proper ſetons and tents may be in gun-ſhot wounds, where there is a loſs of ſubſtance, a ſloughing wound, and of neceſſity a tedious cure, they muſt not be uſed in a clean wound, made ſimply by the thruſt of a ſword, or by the ſtab of a bayonet or knife; but

on the contrary, if the ſurgeon be called early, he may apply his long compreſſes, with a tight bandage inſtantly; for that will both prevent bleeding, and enſure a ſpeedy adheſion; but, if he be not preſent, he muſt try to get out the blood by waſhing and ſoftening the wound, and then put it ſo together with his compreſs and bandage, as to give it a chance of adhering. Our old ſurgeon Wiſeman was much offended with the practice of a Spaniſh ſurgeon, who, when one of the Engliſh ſailors was wounded with a rapier in the arm, ſtitched up the mouth of the wound cloſely. "This caſe, ſays he, I inſert, to ſhow you, that ſuch wounds ought not to be ſtitched, but dreſſed up with ASTRINGENTS, COMPRESS, and BANDAGE; for ſo thoſe wounds, in a good habit of body, with compreſs and bandage, do frequently agglutinate in a few days*."

Nor is even a clean wound of the abdomen, made by a ſabre, difficult to heal. It is a doctrine, to be ſure, that wherever the bowels are expoſed to the air, the air will excite inflammation, and the patient muſt die. This is the doctrine indeed; but doctrine, when oppoſed to practice, is of very little value. Indeed, the abſurdity of this doctrine is manifeſt; for daily, in ſtrangulated hernia, we open the bag of the hernia, inſpect the condition of the bowels, handle them, and turn them round, (expoſed thus to worſe injuries than the air), and then we thruſt them back into the belly, with no little force, and yet all is well. What then would become of this ſo common operation for her-

* Wiſeman, Vol. II. p. 82.

nia, if the bowels were always to inflame, or even if commonly they were to inflame upon being expoſed to the air?

Thus in ſabre wounds, if but the bowels are ſafe, if no turn of inteſtine be wounded, though the bowels deſcend through the wound in the moſt ſhocking manner, ſo as to be ſupported by the hands, ſtill if they be put back, as in the operation of hernia, the patient may be ſafe; he will not indeed always eſcape, but he will ſometimes: and one caſe of this kind will do much in eſtabliſhing our confidence in the powers of nature.

La Motte once, when a perſon was wounded in the ſide, cut off a large piece of omentum, put back the protruded inteſtine, and the patient did well.

Mr. Roſiere, a French ſurgeon in Lower Normandy, put back the inteſtines into the belly of a peaſant's boy who had been gored by a bull. The boy came the next day on foot three miles from his village, carrying in the ſkirts of his ſhirt, and in his hands, a great bundle of the inteſtines which had protruded again; they were put again back, the wound was neatly ſewed, and the boy being kept quiet for ſome time, made a very perfect recovery.

But there is recorded a third inſtance of this, ſtill more ſurpriſing, of a ſoldier who was wounded in the ſide with a halbert. He walked a full mile with his inteſtines protruding from the belly. He alſo had wrapt them in the ſkirts of his ſhirt, and carried them (not in his hands, but) in his hat. The weather, it being Mid-ſummer, was intenſely hot, and the roads duſty;

and it was reported to the author who relates the ſtory, that the inteſtines were as dry as parchment, and blackened with duſt. He was brought to a charitable old lady, who having bathed the inteſtines in warm milk, replaced them, and ſtitched the wound with the needle ; and this ſoldier alſo was perfectly cured.

But there is another caſe, ſtill more wonderful, related by Dr. Cochrane, of a negro, who, reſolving to take away his own life, ſtabbed himſelf in the belly in a ſhocking manner, ſo that his bowels hung down from the wound. He refuſed all aſſiſtance, always tore open the wounds; and the negro-driver, with a brutality exceeding all that we have ever been told of the ſhocking puniſhments and very miſerable condition of that unhappy people, ſwore that he was a worthleſs fellow, and then turned the key upon him, leaving the poor wretch weltering in his blood, and lying naked on the floor of his very miſerable hovel. Next day the ſurgeon found him alive; but it is no wonder that a fellow-creature, feeling himſelf a man, and ſeeing himſelf thus neglected and abuſed, reſolved to rid himſelf of exiſtence. He ſtill refuſed all help. He lived in this condition, ſtill neglected, till at laſt he was able to crawl out of his hovel. He was ſeen going to town carrying the protruded bowels in the coarſe blanket which was wrapped about him. He was ſeen by Dr. Cochrane with the protruded bowels all inflamed and granulating, ſhooting out new fleſh, and covering themſelves with a kind of ſkin. He ſauntered about the plantation, ſwam often in the ſea, lived this idle and irreglar life, but nothing interrupted his cure,

which was ſoon perfect. The tumor of the inteſtines was like a woman's breaſt, and he became ſtrong in the end, and fit for labour*.

After recoveries from ſuch protuſion of the bowels, and ſuch deſperate wounds, nothing can ſeem wonderful: indeed it is not with the deſire of raiſing your wonder, but with the deſign of eſtabliſhing your confidence in the powers of nature, that I cloſe my account of ſabre wounds with the notes of theſe very ſingular caſes.

I ſhall proceed to ſum up the concluſions ariſing from the facts and reaſonings which I have put before you. You will foreſee a ſet of rules very different from thoſe belonging to gun-ſhot wounds; for you perceive, that fleſh wounds with the bayonet, or ſword, or ſabre, are leſs dangerous than gun-ſhot wounds. Theſe require no ſcarifications, no openings, no ſetons paſſed through them; there is no painful ſearching for foreign bodies, nor any ſlow exfoliation of bones; there is neither any danger from too high an inflammation, nor any great riſk of gangrene. If they could be but freed of blood, and their ſides cloſely applied, there might be an almoſt immediate cure. The practice then is extremely ſimple, and may be tolerably repreſented by theſe rules:

1*ſt*, If there be a ſimple wound raiſing a flap of ſkin, perhaps touching the ſcull, or even reaching the brain,

* The author adds an analogy well ſuiting the climate in which all this happened: "Often the mules being gored by the cattle, the owners, having ſecured them, reduce the inteſtines, and ſtitch them up, without any bad conſequences."

it may be put down to adhere; and if there be no danger below, if there be no extravaſation of blood by which the brain might be oppreſſed, or the adheſion of the flap prevented, it will adhere; and of courſe, we have this comfortable aſſurance, that if all be found and ſafe, the flap will adhere; but if there be extravaſated blood, ſplinters of bone, or any cauſe of danger, it will not adhere; and this laying down of the flap is an eaſy attempt, and never can be productive of any harm.

2*d*, Where there is a clean ſabre cut in any of the limbs, if there be no great artery wounded, even though the weapon ſhould have penetrated or cut acroſs a bone, it will heal; it is only intervening blood that can prevent its adheſion, or ſome fault of the conſtitution, ſome infection in the hoſpital, or ſome camp diſeaſe. Wherever we expect to heal ſuch a wound, we are careful to waſh away all clots of blood, to allow the bleeding veſſels time to exhauſt themſelves and to ſtop; and then, inſtead of wrapping ſuch a limb in relaxing poultices, we clean the wound, put the edges neatly together, ſtitch it perhaps, cover it with an adheſive plaſter, dreſs it dry with lint, and never apply any poultice, unleſs it ſhould be required on account of pain and ſwelling, and that will only be on the third or fourth day.

3*d*, If there be a deep and penetrating wound, we try to bring it to the ſame condition with a clean open wound, to purge it of its blood, and ſo cauſe its ſides to adhere; and the ſucceſſes of the ſecret dreſſing, ſo much practiſed in France, ſhould not at leaſt

be despised as a hint, if it be not indeed a direct lesson for the imitation of the surgeon. And however we do in this respect, yet there is this established difference betwixt a gun-shot wound, and the stab of a bayonet, that we make no incision, unless there be some bleeding artery which it is necessary to command; we make no openings in the middle, of even the longest sword wounds; and as for setons, their use is doubtful, even in the case of gun-shot wounds, where there is a sort of tube lined with callous parts, which are to fall into gangrene, and to come out in the form of sloughs; but in a clean wound they would excite inflammation in a most dangerous degree. Setons, then, are never to be used in wounds with the sword, unless they have become absolutely callous, and continue for months in the condition of fistulas without any tendency to heal. But the use of setons in fistulous sores, or of occasional incisions, when abscesses form, must, with many lesser distinctions and rules of practice, be left to the discretion of the surgeon.

4th, If I have related some cases of recovery from wounds passing quite across the breast, and of others where the bowels had been exposed, it was surely not to represent what will commonly happen, nor merely as things to be gazed upon as curious, but not instructive; you may draw this useful lesson from them, that even in the most hopeless case we must not despair, and that our cares for our patient's safety should cease only with his life. And having spoken so much of wonders which nature will perform, it is the more

incumbent on me to ſhow you how dangerous wounds of the great cavities are, even when the danger appears trifling; for if but the point of the bayonet or ſword enter into the abdomen, full-hardly can that patient eſcape: His condition is much like that of a man ſtruck with the ſtiletto, (in the countries where that barbarous kind of murder is ſo often committed), where the weapon is long and ſlender, and the aſſaſſin, ſtriking from his dark corner, draws back the ſtiletto by its thong, and the wounded man neither ſees the hand that ſtruck him, nor, though wounded, can he ſee the wound; he is carried into the hoſpital; the wound is ſo ſmall, that it is hardly diſtinguiſhed even by the ſurgeon; and there the patient lies to take his fate, not ſenſible of half his danger, till on the ſecond or third day that pain begins of which he is ſoon to die in inexpreſſible torments, without a poſſibility of relief.

The laſt obſervation, therefore, is, that though ſometimes the moſt dreadful open wounds of the great cavities have been cured, yet the ſmalleſt penetrating wound, touching the bowels, is commonly fatal; that the wound of the bayonet is of this kind; that inflammation of all the bowels is the cauſe of the dreadful torments in which they die, often delirious with pain; that bleeding, profuſe bleeding, frequently repeated, is the only chance you can give your patient of eſcaping this terrible death.

I have ſaid, that the practice in ſabre-wounds may be tolerably repreſented in theſe rules; intending, by this limited expreſſion, to put you in mind, that this

cannot be confidered as a perfect fyftem of rules, and that much is ftill left to the direction and conduct of the furgeon; for if much were not ftill left to the difcretion and good conduct of the furgeon, where would be that fuperiority of knowledge and judgment which we are all ftriving to attain?

DISCOURSE VIII.

ON THE MEDICAL TREATMENT OF DANGEROUS WOUNDS.

However worthy of your attention thoſe rules of practice may be, which I have been hitherto employed in teaching you, yet there are many things which it is more important for you to be acquainted with than the mere ſurgery of dilating wounds, or extracting balls. Thouſands periſh by diſeaſes, while a very few die by the ſword; and the fate of the wounded depends much upon their being kept free from thoſe diſeaſes which follow an army, like the vultures that hover over its courſe. The medical treatment then muſt be more important than the mere ſurgery of gun-ſhot wounds; and I ſhall endeavour to explain to you how to conduct your patient through theſe dangers; by bleeding, while in danger of inflammation; by rich diet and wine, while undergoing a long and weakening ſuppuration; and by bark, when gangrene is likely to come on: And I ſhall explain to you, as well as I am able, all that hurts or heals his wound, and all that endangers his gene-

ral conſtitution, or keeps it ſafe; for indeed upon theſe matters, more than upon the immediate wound itſelf, depends the patient's ſafety.

In a ſubject like this, there muſt, no doubt, be ſome great and leading idea, which, being ſeized and unfolded, would make every ſubordinate idea eaſy and intelligible, and render the whole line of conduct very direct and plain; but I am ſure that this general idea cannot be made good to you without a knowledge of the whole ſubject, of which I muſt not ſuppoſe you are poſſeſſed. I am ſure it will be right to depart from my uſual plan, and, inſtead of a general and diffuſe explanation, followed by cloſer rules, lay down the general rules firſt, and then proceed to deduce from the practice itſelf thoſe principles, without which the ſubject cannot be fully underſtood.

I. When your wounded patient is firſt brought to you, he is in great confuſion; there is a tremor, a tonic ſtiffneſs, or almoſt a convulſion of the whole frame; there is a coldneſs, fainting, and nervous affection; but it is merely a nervous affection, and you ſhould treat it as ſuch. You may expect it to ſubſide in time, and therefore ſhould give ſome warm cordial and large opiates to quiet the commotion; this is no time for bleeding, whatever the nature of the wound may be. If the ſtupor continue, you ſhould give cordial draughts, and wine.

II. If this nervous commotion being quieted, a ſharp fever ſhould come on, ſtill do not bleed, but rather be upon the reſerve; for perhaps this, which at firſt ſeems to be a pure inflammatory fever, may turn out to be

a fit of an ague, to which the patient is ſubject; it may be a low and malignant fever; it may be an attack of ſome camp diſeaſe; and if a diarrhœa, great weakneſs, and low muttering delirium, ſhould come on immediately after you had bled your patient freely, you would be diſtreſſed at the thoughts of what you had done, and you would, indeed, have much to anſwer for.

III. Reſerve your bleedings for thoſe more dangerous caſes, where high inflammation is ſo often fatal, and do not bleed in wounds of the hips, ſhoulders, or limbs; reſerve bleeding for wounds of the breaſt, or belly, or great joints; for, in all wounds of cavities, inflammation, which can hardly be eſcaped, is the great danger.

IV. If a man be wounded after a full meal, there can be no doubt that a gentle vomiting muſt be uſeful, where it is allowed by the circumſtances of the wound. The old phyſicians found their advantage in it, and aſcribe the good effects of vomiting to the preventing of crude and ill concocted chyle from entering into the ſyſtem, ſo as to kindle up a fever. There is no doubt, that a meal, which was no load during health, will be a great oppreſſion upon a diſordered ſyſtem, and the carrying it off muſt be a great relief; although the old phyſicians, by talking this uſeleſs jargon about ill concocted chyle, might almoſt provoke us to reject both the doctrine and the practice. The ſyſtem cannot be weakened by a gentle emetic; and if the ſyſtem ſhould fall low after vomiting, it were eaſy to ſubſtitute a fitter ſupport and better excitement than

that of an oppreſſed ſtomach and loaded inteſtines, by firſt diſcharging theſe crude meals, and giving when the ſtomach were emptied, food of eaſy digeſtion, and cordials ſuited to the condition of the ſyſtem.

V. But in every wound there comes a period of weakneſs, in which we repent of every bleeding that we may have made, even when it was really needed; a period in which, by confinement and pain, occaſional fever, diarrhœa, profuſe ſuppuration, or colliquative ſweats, the patient falls ſo low, that it is not eaſy to ſupport him through the cure; and thus there are two great principles in the treatment of gun-ſhot wounds! That even at firſt we ſhould be ſparing of blood; and, that the period of weakneſs which is to ſucceed, is the greater danger; on this ſingle point hangs all the practice.

We are not entitled to bleed in a mere fleſh wound, becauſe every gun-ſhot wound is firſt to fall into a partial gangrene, then to give out a profuſe ſuppuration; and if there be no wound of a joint, nor fractured bone, the firſt inflammation never runs too high.

Since then there is no danger from the preſent inflammation of a fleſh wound, why ſhould we waſte that ſtrength with bleedings, which is ſoon to be ſo ſeverely tried by weary confinement, great gleetings, profuſe ſuppurations, and pain, and want of reſt? Here we are to expect from time to time new collections of matter, new paroxyſms of pain, new diſcharges of balls or pieces of cloth, and ſtill returning acceſſions of fever, which quite exhauſt the patient, till in the end perhaps he dies.

Bleeding is to be ufed only in the fpring, when new recruits have come into the field, full of young blood, and inclined to every inflammatory difeafe; in fpring alfo, even the veteran foldiers have lain in cities during winter, and are recruited from the fatigues of their laft campaign, fo that they even will bear bleeding; in fpring alfo the peripneumony, rheumatifms, and inflammatory difeafes of all kinds, prevail. With officers alfo, it is plain, that bleeding may be more freely ufed than with common foldiers, for the officers feel lefs of the hardfhips of a foldier's life; the officer is fed, and clothed, and lodged well, and too often indulges in wine, and lives luxurioufly, while his fellow-foldiers are fuffering the feverity of the weather, and the want of clothing, with poor diet, unwholefome drink, and all the other hardfhips of war. It is perhaps a proof of this that Mr. Ranby, in his book, gives no examples of fuccefs from free bleedings but in young men of high rank, moft likely becaufe thofe young men were better able to bear this practice; but I fear too there is fomething here of flattery to the great, a meannefs from which the high abilities of Ranby fhould have exempted him. He muft have felt, when he fpoke only of the wounds of princes, that a poor fellow in the ranks was as fair a fubject for obfervation, and his wound as good an argument in a point of practice, as that of the Heir Apparent: If Ranby would fhow himfelf thus fond of curing princes, he fhould not have been afhamed alfo to fpeak of men.

I think it of more importance to repeat the cautions

againſt bleeding, than to direct you when to bleed. I ſay you muſt not bleed ſo freely in common ſoldiers; you muſt not bleed thoſe exhauſted with the fatigues of a long campaign; you muſt not bleed in autumn, when diſeaſes of weakneſs are frequent; you muſt not bleed in the midſt of camp-diſeaſes, when dyſenteries or fevers prevail; and in the foul air of hoſpitals, bleeding, how much ſoever it may ſeem required, ſhould be done with a very ſparing hand; to be bleeding can hardly be neceſſary in a mere fleſh wound.

It remains then for me to mark out for you the preciſe caſes in which bleeding may be freely uſed.

You muſt bleed freely in all wounds of cavities, for there inflammation is the moſt immediate and preſſing danger. Your bleedings ſhould be for preventing the inflammation, for they will not cure it. If inflammation once come on fairly, you can hardly ſave.

If inflammation come upon the breaſt, the pulſe riſes, the patient breathes ſhort, with ſuch pain and oppreſſion, that he is at laſt ſuffocated, and dies. If the belly be allowed to inflame, he dies in torments which are called "miſerere mei," as not to be deſcribed. And as for the inflammation of a wounded joint, it is attended with ſuch violent fever and racking pain, that the patient dies; or if he paſſes through thoſe firſt dangers, it is only to die more ſlowly of the great diſcharges, while the eroded cartilages and thoroughly diſeaſed bones extinguiſh all hopes of a cure.

Now, if a patient will keep ſuch a limb, or if he be wounded in the belly, head, or breaſt, or perhaps with

two ſuch dangerous wounds, you muſt bleed him profuſely, I had almoſt ſaid, without bounds. But while I deliver this leſſon, I cannot but remember to qualify and limit this rule of bleeding, by ſhowing how much you may go beyond the mark.

The French ſurgeons are accuſtomed to bleeding, with a freedom which an Engliſh ſurgeon has no idea of, and can hardly excuſe; for they bleed twice, thrice, or even four times in twenty-four hours, and continue it ſometimes to the fifteenth or twentieth day; and there is no doubt that ſometimes, by ſuch profuſe bleedings, they have ſaved thoſe who would have been loſt by a more timid practice. It is to this daring practice that I aſcribe their ſucceſs, ſometimes wonderful and eſpecially ſo in wounds of the cavities or joints; but there are caſes which might be produced from the beſt French writers, which ſhould ſerve you rather as warnings than as examples; and I ſhall give you ſuch a caſe, from the practice of Mr. Ravaton, one of their moſt famous ſurgeons; a caſe which I mention the more willingly, becauſe Mr. Ravaton ſeems conſcious that he had gone too far, confeſſing freely, that his patient was ſaved rather by his own natural ſtrength, than by the ſurgeon's ſkill.

He was a young man belonging to a militia regiment, and was deſperately wounded in a duel, and the corps wiſhing to conceal the affair, entreated Mr. Ravaton to receive him privately into his houſe: The ſword had paſſed acroſs the breaſt, in above the pap, and out betwixt the fourth and fifth rib behind; he was brought to the ſurgeon's houſe more dead than

alive, insensible, without pulse, continually putting up blood; there being emphysema at each wound, Ravaton dilated both; the difficulty of breathing was such that he could not speak, but tossed himself in the bed from side to side, six times in the minute, throwing about his legs and arms in great agony.

He was bled copiously five times in the space of three hours: before the evening he was able to speak; by eleven at night he was much relieved. So far every thing was well.

But here followed something still more daring. Mr. Ravaton ordered an apprentice to sit with lights in his room, and instructed him, that if this distress continued he should open the vein during the night. Mr. Ravaton, from his chamber, heard him crying out during all the night to be bled, and in the morning he found that the young man had drawn blood no less than nine times.

By this bleeding the patient had fallen into a state of insensibility, in which he lay for two days; and when he recovered, he awoke as it were from a dream, neither remembering his having been wounded, nor having any consciousness for some time of his dangerous state. He complained no longer of the difficulty of breathing; and, by giving him nourishing soups and broths, Ravaton recovered him from his dangerous weakness; the cough, fever, excessive sweatings, gradually subsided, and on the twenty-second day he left Mr. Ravaton's house, though quite pale, and woefully reduced.

Ravaton words this account so cunningly as not to

make any clear confeffion of his own rafhnefs; but he gives a ftrong hint, that, on the morning, he really feared that his apprentice had bled this young officer once too often *.

Such imprudences as thefe I am fure you never will commit; for I know that it will be difficult for you to keep up your refolution to that affurance and boldnefs in bleeding which is really needful. You will be too fearful, I am perfuaded, rather than too bold; and therefore I muft conclude with obferving that even this bleeding was not fatal, and that in wounds of the bowels and joints bleeding can hardly be too profufe; but ftill you muft be careful, that while you dare to do every thing that is neceffary for prefent fafety, you rifk nothing which may produce future danger.

Thus you are to ufe bleeding boldly, but with difcretion; you are to ufe it in the young and healthy, in wounds of the head, the breaft, the belly, or of the great joints.

But this is not in the common courfe of things. Battles or fieges feldom take place in the fpring; the army is moving eafily; few are fick, and ftill fewer wounded; the few that are flightly wounded are fent to lie in the neareft towns, and thofe who are wounded in the great cavities generally die.

But your practice begins when all manœvering is over; and when, towards the end of the campaign there have been great battles and fieges; when perhaps the army is retreating, while all around you is nothing

* Ravaton, p. 260.

but confusion and distress. The wounded increase in number; they are crowded into hospitals, and hurried from place to place; they are exhausted with the fatigues of the field, and their sickly constitutions are now entirely worn down, with long suffering and pain. In short, thousands are in danger of low fever, while a very few only can need bleeding, or even be in danger of inflammation, unless indeed it be of that erysipelatous or gangrenous kind which is so frequent in hospitals and camps.

The second great principle, which I proposed to you somewhat in the form of a theory, is therefore more respectable than a mere theory. It is not so much a general theory, it is rather a general fact, and written in characters so plain that he that runs may read; and it is well that you be instructed in this; for though the omission of bleeding when required be a great fault, to bleed a man who is in danger of low fever, or labouring under a camp-disease, were to loosen entirely the little hold he might have of life.

Perhaps it may not yet appear distinctly to you that there is any strict connection betwixt the condition of the system and the easy healing of wounds, because you do not know that the fever which attends gun-shot wounds is generally of the low kind, and that every thing that depresses the system, though but for a moment, changes the face of the wound.

The fever which attends an ill-conditioned gun-shot wound, is attended with great heat, thirst, a foul tongue, a low, quick, unequal pulse, and there is a low muttering delirium, or, as Ranby expresses it, the

head not quite clear; and bark, wine, and elixir of vitriol, are to be ufed.

And as for the wound itfelf, the worft appearance of a gun-fhot wound always proceeds from weaknefs, arifing from fome very direct and manifeft caufe: nor does the wound ever look thoroughly ill, till the patient is weakened by long confinement or imprudent evacuations, or, as often happens, from excefs of the natural difcharge.

Ranby remarks, that the ftump fhall promife all imaginable fuccefs for eight or ten days, when, fuddenly changing its complexion, it fhall begin to gleet prodigioufly, look pale, and flabby; "and this gleeting, or profufe difcharge, runs the patient out of the world in a little while." The caufe of this change on an amputated ftump, or of the ill condition of any gun-fhot wound, is plainly weaknefs; for, if a patient be ufing the bark, or opium, or wine, if he be deprived of the fupport of thefe medicines for a fingle day, the fores change; if he be feized with the fit of an old ague, or is attacked with dyfentery, fever, or any camp-difeafe, the appearance of the wound inftantly changes; and, when at any time diarrhœa comes on, the wound is altered as fuddenly as the complexion; and if the loofenefs continue but a few days, the wounds go all wrong, for the patient, being weakened, becomes cold in his extremities, his vifage becomes ghaftly and yellow, the ftump looks flabby and pale, and the flefh feparates from the bones, the bone projects, the relaxed veffels ooze out a bloody ferum, and the blood lying from

dreſſing to dreſſing, produces a putrid ſore, of which the patient dies.

If you are in a great hoſpital, you will perceive the ſtumps, the ſores, the gun-ſhot wounds, and the fractured limbs, all go wrong at once; any general cauſe of weakneſs, or fever, produces this change over the whole hoſpital, while any particular cauſe of weakneſs will produce it in any one individual caſe. The paroxyſm of an intermittent fever, the accident of a foul ſtomach, two days of diarrhœa, will not only change the complexion of a ſore, but will alter its nature in a degree not eaſily to be counteracted.

And in the largeſt hoſpital one foul ſore or gangrenous limb, one unlucky fever, or the crowds of wounded which a battle pours in upon them, makes a whole hoſpital exhibit everywhere the ſame diſmal ſcene.

The marks which diſtinguiſh this condition of the ſyſtem are ſo plain, and the appearance of an ill-conditioned and flabby wound deluged with matter, and ſometimes blackened with exuding blood, is ſo peculiar, that I hold this notice to be enough; only it will be right that I explain to you, before I deſcend to the particular rules of practice, how terrible the conſequences of ill air are, whether in hoſpitals or in a camp.

It is very well known, that in the autumnal months, in marſhy ſituations, in crowded hoſpitals, in beſieged cities, where the whole country is driven in upon the town, wounds will never heal. Parée ſays*, that

* P. 284.

in the ſiege of Rouen the air was ſo noxious that no wounds would heal; and the beſieged, finding that all their wounds became gangrenous, reported that the beſiegers had poiſoned their balls; the beſiegers alſo, ſeeing none but putrid ſores in the camp, believed that their wounds were poiſoned; and, both within and without the city, ſuch was the ſtate of the air, and ſo putrid were all wounds, that the ſurgeons could ſcarcely look upon the ſores, or endure the ſmell; and if they neglected them for a ſingle day, they found them full of worms.

The hiſtory of one great hoſpital, the Hotel Dieu of Paris, which has been, I fear, an evil rather than a bleſſing to that city, has always appeared to me very curious.

Parée, 200 years ago, complained that in the Hotel Dieu ſores would not heal, and no operations could be rightly performed. After him Diouis, 100 years ago, proteſts againſt performing operations in the Hotel Dieu; and adviſes, that an hoſpital ſhould be built in the environs of the city, for thoſe who, have fractured ſculls, required the operation of the trepan. And Mr. Deſſault, late ſurgeon of the Hotel Dieu, ſaid, that wherever he performed the operation of the trepan, his patients were ſure to die; by letting them alone they had ſome little chance of living. In his time, therefore, they tried to relieve compreſſion, or coma, by bleedings, poultices, or bliſters, but never ventured to perform the trepan.

The two great rules then which I have laid down for you are theſe: To bleed only in the ſpring, when men

are juſt come into the field full of young blood, luſty, and ſtrong, diſpoſed to inflammatory diſeaſes. But in the autumnal months, in marſhy ſituations, in crowded hoſpitals, or unhealthy camps, when the men having been exhauſted with a long campaign, or having ſtruggled through lingering wounds, you look only for weakneſs and fever, gleety ſtumps and foul ſores; inſtead of bleeding, you muſt truſt to air and cleanlineſs, and bark and wine.

This ſingle principle will, I hope, make the whole buſineſs very plain to you; for, indeed, if a young man, without ſome leading principle, enter upon theſe duties; if he go into the camp with only ſome looſer notions of bleeding in inflammation, or of bark when gangrene is to be feared; he will be little valued there: if he do not underſtand the connection betwixt the particular wound and the general health; if he do not know with a glance the conſtitution of a patient, or the true ſtate of his ſore; if he be not careful to retain ſome general principle, which, like a myſtic clue, may lead him through this labyrinth; he will ſee thouſands dying around him, without knowing the cauſe, like the fable of the Grecian camp, falling under the inviſible ſhafts of Apollo.

This general view will reduce your notions of practice into a ſimple and manageable ſyſtem, and let you know what you are doing. You muſt always keep your eye upon the conſtitution of your patient, for there are many things more important to his health and ſafety than dilating his wound, or extracting the ball.

I. If your patient be an officer, well fed, and warmly clothed, in full health, riding perhaps a pleaſant journey while his men are marching, and living luxuriouſly while they are ſuffering the hardſhips of their way of life, he will bear bleeding well.

II. If a raw ſoldier be wounded, who has come from home but lately; who has lived in garriſon, and at his eaſe; who is full of young blood, and has what Sir John Pringle has called the conſtitution of ſpring; he alſo will bear bleeding.

III. You ſhould bleed very freely in wounds of the belly, head, or breaſt, or great joints; but there is no need of bleeding in a mere fleſh-wound, where inflammation never runs high; and you ſhould be ſparing of the patient's ſtrength in fractured limbs; for though there be inflammation at the firſt, it is to be ſucceeded by by long confinement, tedious exfoliations of the bones, and a profuſe diſcharge.

IV. If a patient have lain long with gleeting wounds, and a malignant ſore; if this ſore burſts out from time to time, and will not heal; it will, too often, be explained to you, by the general air of the hoſpital, or by the habit of the patient's body: but if there be no ſuch cauſe, you will then renew your ſearch for balls, or pieces of cloth, or ſplinters of bone.

V. But if you attend cloſely to the conſtitution of your patient, and the air in which he lives, you will find in the ſoldiers who have lain long in your hoſpitals every mark of weakneſs; you will find pale and flabby wounds, gleeting ſores, exfoliating bones, and ſtumps that will not heal; you will find, on the other

hand, as the caufes of thefe, frequent fevers, hectic, diarrhœa, night-fweats, profufe evacuations from the wounds, which, as Ranby expreffes it, "run the patient out of the world:" and in exigencies like thefe, you will find opium the beft remedy for the diarrhœa, wine and fpirits of vitriol for the gleeting fores, bark for the febrile paroxyfms, and air and cleanlinefs for the general health. Attributing much of their dangers and fufferings to the tainted air, you will drive all loiterers from about your hofpitals, and thofe who are really ill you will try to fend early home; and confidering the duty and the feelings which prefs upon you at fuch a time, you will rifk all patronage for yourfelf, to procure conveniencies for your foldiers; you will dare to offend, where it is neceffary, in a right caufe; you will fpare neither folicitation nor remonftrances; you will be fteady and perfevering, but ftill refpectful to thofe who are over you in command; refpectful, not from any fear of your own intereft, but from a manly fenfe of fubordination and fervice, and a fincere defire of gaining your end, which is eafily attained by a winning manner, but never by that conduct which is too apt to be felt as rude or mutinous by thofe who are in command above you.

But, above all things, learn to refrain from after complaints; for at the end of a war they found too like the murmuring of thofe who are difappointed of the profits of it, and ill become the character which you fhould endeavour to fupport.

END OF VOLUME FIRST.

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